Tho. Dilworth
Schoolmaster
H. Burgh Sculp. 17

THE Schoolmaſters Aſſiſtant:

BEING A

Compendium of ARITHMETIC,

BOTH

Practical and Theoretical.

In Five PARTS.

CONTAINING

I. Arithmetic in Whole Numbers, wherein all the common Rules, having each of them a ſufficient Number of Queſtions, with their Anſwers, are methodically and briefly handled.

II. Vulgar Fractions, wherein ſeveral Things, not commonly met with, are there diſtinctly treated of, and laid down in the moſt plain and eaſy Manner.

III. Decimals, in which, among other Things, are conſidered the Extraction of Roots; Intereſt, both Simple and Compound; Annuities, Rebate, and Equation of Payments.

IV. A large Collection of Queſtions, with their Anſwers, ſerving to exerciſe the foregoing Rules; together with a few others, both pleaſant and diverting.

V. An Appendix of Duodecimals, commonly called Croſs Multiplication; wherein that Sort of Arithmetic is thoroughly conſidered, and rendered very plain and eaſy; together with the Method of proving all the foregoing Operations at once by Diviſion of ſeveral Denominations, without reducing them to the loweſt Term mentioned.

The Whole being delivered in the moſt familiar Way of *Queſtion* and *Anſwer*, is recommended by ſeveral eminent *Mathematicians*, *Accomptants*, and *Schoolmaſters*, as neceſſary to be uſed in *Schools* by all Teachers, who would have their *Scholars* thoroughly underſtand, and make a quick Progreſs in ARITHMETIC.

To which is prefixt, An ESSAY on the *Education* of YOUTH; humbly offer'd to the Conſideration of PARENTS.

The Eleventh Edition.

By THOMAS DILWORTH,

Author of the *New Guide* to the *Engliſh* Tongue; *Young Book-keeper's Aſſiſtant*; *&c. &c.* and *Schoolmaſter* in *Wapping.*

> *All Things, which from the very firſt Original Being of Things, have been framed and made, do appear to be framed by the Reaſon of* Number; *for this was the principal Example or Pattern in the Mind of the* CREATOR.
>
> Anitius Boetius.
>
> *Thou* [O LORD] *haſt ordered all Things in Meaſure,* Number, *and Weight.*
>
> Wiſdom xi. 20.

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THE YOUNG
BOOK-KEEPER's Aſſiſtant:

SHEWING HIM,

In the moſt plain and eaſy Manner,

The ITALIAN Way of Stating

DEBTOR and CREDITOR:

WITH

Proper and inſtructive Notes under every Entry in the WASTE-BOOK, where neceſſary, by which the Method of Journalizing is rendered more eaſy and intelligible; and alſo the like Notes in the JOURNAL and LEDGER, inſerted by way of Information, how to poſt the JOURNAL, and correct Errors in the LEDGER: Wherein there is a great Variety of Examples, not only in the common and ordinary Way of buying and ſelling, but in that of trading beyond the Seas, both for a Merchant's Self and in Company. All which is contained in two Setts of Books, directing the Learner not by Precept only, but by Example, how to draw out a new Inventory from the old Books, and inſert it in the new ones; and the Trade continued as if it were in the real Shop or 'Compting Houſe.

To which is annexed,

A SYNOPSIS or COMPENDIUM
OF THE
Whole Art of ſtating DEBTOR and CREDITOR,

In all the Circumſtances of BOOK-KEEPING, both in Proper, Factorage and Company-Accompts, Domeſtic and Foreign.

THE WHOLE

Deſigned for the Uſe of Schools in *Great Britain* and *Ireland*, and in the *Engliſh* Plantations and Colonies abroad; for the Help and Aſſiſtance of Merchants in their ſeveral 'Compting-Houſes; and for young Gentlemen at their firſt Entrances on their Mercantile Apprenticeſhips.

The like, for Eaſe to the Maſter and Benefit to the Scholar, not extant.

By THOMAS DILWORTH,

Schoolmaſter in *Wapping*; Author of the *New Guide to the* Engliſh *Tongue*, *Schoolmaſter's Aſſiſtant*, &c. &c.

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THE
PREFACE Dedicatory.

To the Reverend and Worthy
SCHOOLMASTERS
IN
GREAT BRITAIN and IRELAND.

GENTLEMEN, a

AFTER *returning You my moſt hearty Thanks for Your kind Acceptance of my* New Guide *to the* Engliſh *Tongue, permit me to lay before you the following* Pages, *which are intended as an* Help *towards a more ſpeedy* Improvement *of your Scholars in* Numbers, *and at the ſame Time, to take off that* heavy Burden *of writing out* Rules *and* Queſtions, *which you have ſo long labour'd under.*

I need not, I preſume, ſay any thing concerning the Uſefulneſs of, and Advantages that accrue to Mankind in general from Arithmetic, *ſince they are by this Time, pretty well known; and alſo deſerve the Employment of a much better* Pen *than mine can pretend to be; but I will venture to ſay thus much, and I believe you will pardon me for it, that* THIS *(by putting one into each* Arithmetician's *Hand) will not only prove a kind* ASSISTANT *to You, but upon Trial, be found at once, both to delight and improve the Minds of thoſe who are committed to your Care.*

I have gone through all the Parts of Arithmetic, *commonly taught in* Schools, *and have included ſeveral others no leſs uſeful: And though I have given more* Queſtions *to work upon in this* Rule *(which was abſolutely neceſſary; none having yet calculated their* Performances, *of this* Kind, *for the Uſe of*

School-Boys) *I have endeavoured at the ſame time to reduce the* Whole, *to as neat and portable a* Volume, *as any that have gone before me.*

I muſt confeſs, I do not propoſe by THIS, *to add to any* Maſter's *Knowledge in* Arithmetic, *who, I imagin, is already acquainted with every thing contained in this* Compendium; *for which Reaſon it is reduced to the narrow Compaſs it now appears in, without particular Directions for working the* Operations *at large; and therefore, I conceive, here is room enough left for every* Man *to ſpeak his own Mind, and inſtruct his* Pupils *in his own* Method. *And,*

I believe, it is confeſſed by All, that it is a Taſk too hard for Children *to be made compleat* Maſters *of* Arithmetic; *and therefore the beſt Way of inſtructing them in it, is, moſt certainly, firſt to give them a general Notion of it in the eaſieſt Manner, and next to enlarge upon it afterward, if there be Time; otherwiſe it muſt be done by themſelves, as their Increaſe in* Years, *and Growth in* Underſtanding *will permit.* * “ For *Arithmetic* is the more valuable,
“ as it is the more *exact*, *eaſy* and *ſhort*; and the
“ *Art* lies in giving as few *Rules* as poſſible, and
“ clearly explaining them; and not confounding
“ *Principles* together, and then diverſifying them
“ into ſeveral *Rules*, when they are built on the
“ ſame *Reaſon*, which has not only made *Arith-*
“ *metic* ſeem difficult of *Acceſs*, but has hinder'd
“ many from being *Accomptants.*”

To enter into a Detail *of the following* Particulars, *would be tedious, and ſwell this* Preface *beyond its juſt* Limits; *but that the* kind Reader *may not be wholly at a Loſs, I ſhall beg Leave to ſpeak as follows,* viz.

1. *That the* Whole *is divided into* Five Parts, *as the* Title Page *expreſſes it.*

2. *That the* Rules *and* Examples *are contrived in the eaſieſt* Manner, *and the* Whole *put in ſuch an eaſy* Method, *as is no where elſe extant.*

3. *I have omitted* Reduction *of* Foreign Coins, *partly becauſe all thoſe* Tables, *which I have met with, which ſhew the Value of* Foreign Coins *in* Engliſh Mony, *are very erroneous; but principally becauſe all ſuch* Queſtions *as relate to the turning of the* Mony *of one* Country *into that of another, are much better anſwered under the Head of* Exchange. *For the* Value *of* Foreign Species *(ſuch I mean as relate only to* Exchange) *both of* Gold *and* Silver, *in every* Country *is unſettled, and therefore ſuch* Coins *are ſubject to vary in their* Prices, *as the* Merchants *find an Opportunity to profit by them. Hence proceed the* various Courſes *of* Exchange; *and from them again, the particular* Worth *of any* Quantity *of* Foreign Coin *in* Engliſh Mony, *which is ſometimes* more, *ſometimes* leſs, *according as the* Courſe *of* Exchange *runs at* that *Time when ſuch* Foreign Coin *becomes due. Add to this the* Agio, *or* Advance Mony, *uſually paid* Abroad *on the changing* Current Mony *into* Exchange *or* Bank-Mony, *which is* 2, 3 *or more* per Cent. *in Payment, according to what the* Exchange *or* Bank Mony *is worth more than the* Current Mony, *and this cannot be done otherwiſe than by the* Rule *of* Three.

4. *In* Intereſt, &c. *by* Decimals, *I have follow'd Mr.* WARD's *Method, by which Means the* Rule *is drawn into a much narrower Compaſs; and appears more beautiful to the Eye than in Words at length.*

5. *In all Places where it could be done conveniently, I have given Directions for varying the* Examples *by Way of* Proof; *becauſe it not only diſcovers the* Reaſon *of the* Operation, *but at the ſame Time both produces a new* Queſtion, *and proves the* old One. *And ſure I am, that the varying the* Queſtion, *when it may be done under the ſame* Rule, *contributes very much towards a thorough Underſtanding of it, and making a* good *Accomptant, as every one's Experience will teach him.*

6. *I have thrown the Subject of the following Pages into a* Catechetical Form, *that they may be the more inſtructive; for* Children *can better judge of the Force of an* Anſwer, *than follow* Reaſon *thro' a Chain of* Conſequences. *Hence alſo it proves a very good* examining Book; *for at any Time, in what Place ſoever the* Scholar *appears to be defective, he can immediately be put back to that* Place *again, without the formal Way of beginning every Thing anew.*

7. *In order to make the* Progreſs *ſtill quicker, every* Example, *to be wrought, hath its* Anſwer *annexed to it: So that they who do not chuſe to have every* Operation *proved by varying the* Queſtion, *may know without it, whether the* Work *be right or not.*

And now after all, it is poſſible that ſome, who like beſt to tread the old beaten Path, *and to* ſweat *at their* Buſineſs *when they may do it with* Pleaſure, *may ſtart an* Objection *againſt the Uſe of this* well intended Aſſiſtant; *becauſe the Courſe of* Arithmetic *is always the ſame; and therefore ſay,* ‘That ‘ſome Boys lazily inclined, when they ſee another ‘at work upon the ſame Queſtion, will be apt to ‘make his Operation paſs for their own;’ *But theſe* little Forgeries *are ſoon detected by the Diligence of the*

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the Tutor: *Therefore, as* different Queſtions *to* different Boys, *do not in the leaſt promote their* Improvement: *So neither do the ſame* Queſtions *hinder it. Neither is it in the Power of any* Maſter *(in the Courſe of his* Buſineſs) *how full of Spirits ſoever he be, to frame* new Queſtions *at Pleaſure in any* Rule, *but the ſame* Queſtions *will frequently occur in the* ſame Rule, *notwithſtanding his greateſt* Care *and* Skill *to the contrary.*

It may alſo be further objected, ‘That to teach by ‘a printed Book, is an Argument of Ignorance ‘and Incapacity,’ *which is no leſs trifling than the former. He indeed (if any ſuch there be) who is afraid his* Scholars *will improve too faſt, will undoubtedly decry this* Method: *But that* Maſter's Ignorance *can never be brought in queſtion, who can begin and end it readily; and moſt certainly that* Scholar's Non-Improvement *can be as little queſtioned, who makes a much greater* Progreſs *by* This, *than by the* common Method.

As to the Order *of the* Rules, *I can hardly find* two Maſters *follow it alike; ſome liking beſt to teach that* Rule *firſt, which another thinks more convenient to teach afterward; while a third looks upon it as a Matter quite indifferent, among* ſome Rules, *which he teaches firſt. But this need be no* Hindrance *to the Uſe of this* Book. *For however the* Rules *are placed here, every Man may turn to that* Rule *firſt, which he likes ſhould be taught firſt; and if a* Maſter *has a Mind to teach* Vulgar Fractions *immediately after* Reduction *in* Whole Numbers, *as ſome do, he may do it as eaſily, as in the Order they now lie.*

To this eleventh Edition, *I have added, An Appendix of* Duodecimals, *commonly called* Croſs

Multiplication; *wherein I have largely treated of that ſort of Arithmetic, in every Branch*; *ſhewing how the ſame may be proved by varying the Operations*; *by whole* Numbers; *by vulgar* Fractions, *and by* Decimals; *and laſtly by a particular ſort of* Diviſion, *wherein the Diviſor, Dividend and Quotient are each of them of ſeveral Denominations, juſt as the Factors and Products are in* Multiplication, *without reducing them into the loweſt Term or Denomination mentioned. And as* Duodecimals, *by all the Writers that I have ſeen, except Mr.* Hawney, *have only been ſuperficially treated of, I think I may venture to ſay, without any Breach of Modeſty, that this is the compleateſt Piece extant.*

I ſhould have been very glad to have ſeen an Attempt *of* this Nature, *ſtampt by the Authority of ſome* Perſon *of* Diſtinſtion *and of* better Abilities; *but ſince no* abler Hand *has undertaken it, I hope its homely Appearance will not leſſen its* Uſefulneſs.

The Printer's Errors, *as well as my own* Defects, *I hope will candidly be overlook'd: But becauſe a Man's Failings are ſo familiar to himſelf, that he can ſcarce diſcern them; therefore the kind Admonitions of a* good natur'd Reader, *ſhall always be very acceptable.*

I have nothing more to add, but my repeated Thanks *for* Favours *received, together with my* earneſt Deſire *that you may be proſperous in Your* ſeveral Undertakings, *and to beg this* additional Favour *of being eſteemed,*

GENTLEMEN,

Your moſt humble, and
moſt obedient Servant,
THOMAS DILWORTH.

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ON THE Education of YOUTH

AN ESSAY;

Humbly offer'd to the Conſideration of PARENTS.

THE right Education *of* Children, *is a Thing of the higheſt Importance, both to* Themſelves *and the* Common-wealth. *It is* this, *which is the natural Means of preſerving* Religion *and* Virtue *in the World: And the earlier* good Inſtructions *are given, the more laſting will be their Impreſſion. For it is as unnatural to deny* theſe *to* Children, *as it would be to with-hold from them their neceſſary Subſiſtance. And happy are thoſe, who, by a* religious Education *and watchful Care of their* Parents, *their* wiſe Precepts *and* good Examples, *have contracted ſuch a Love of* Virtue *and Hatred of* Vice, *as to be removed out of the Way of* Temptations. *And 'tis owing to the Want of* this Education, *that many, when they leave their* Schools, *do not prove ſo well qualified as might be expected. This great* Omiſſion *being for the moſt part chargeable on the* Parents, *I hope the following* Particulars (*which are the common Voice of our* Profeſſion) *will not be taken amiſs. And*

1. *A conſtant Attendance at* School *is one main Axis whereon the great Wheel of* Education *turns. Therefore if that Obſervation, which is commonly made by* Parents *be true,* That the Maſters have

Holidays enough of their own making, *there is, by their own Confeſſion, no Neceſſity for them to make an Addition.*

2. Parents *ſhould never let their own Commands run counter to the* Maſter's, *but whatever* Taſk *he impoſes on his* Pupils, *to be done at Home, they ſhould be careful to have it perform'd in the beſt Manner, in order to keep them out of* Idleneſs. “ * For vacant Hours move on heavily, and “ drag *Ruſt* and *Filth* along with them; and “ 'tis full Employment, and a cloſe Application “ to Buſineſs, that is the only Barrier to keep out “ the Enemy, and ſave the *future Man.*

3. Parents *ſhould endeavour to be ſenſible of their* Childrens Defects *and want of* Parts; *and not blame the* Maſter *for* Neglect, *when his greateſt Skill, with ſome, will produce but a ſmall Share of* Improvement. *But the great Misfortune is, as the* Proverb *expreſſes it*; Every Bird thinks her own Young the faireſt: *And the tender* Mother, *tho' her Son be of an ungovernable Temper, will not ſcruple to ſay,* He is a meek Child, and will do more with a Word than a Blow, *when neither* Words *nor* Blows *are available. On the other Hand, ſome* Children *are of a very dull and heavy* Diſpoſition; *and are a long Time in gathering but a little* Learning, *and yet their* Parents *think them as capable of* Inſtruction, *as thoſe who have the moſt bright and promiſing* Parts: *And when it happens that they improve but ſlowly, tho' it be in Proportion to their own* Abilities, *they are hurried about from* School *to* School, *till at laſt they loſe that Share of* Learning, *which otherwiſe, by ſtaying at the ſame* School, *they might have been* Maſters *of.*

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* Watts's *Eſſay.*

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of. Juſt like a ſick, *but* impatient Man, *who employs a* Phyſician *to cure him of his* Malady; *and then, becauſe the* Diſtemper *requires* Time, *as well as* Skill *to procure his* Health, *tells him,* 'He has all 'along taken a wrong Method;' *turns him off*; *and then applys to another, whom he ſerves in the ſame Manner*; *and ſo proceeds till the* Diſtemper *proves incurable.*

4. *It is highly neceſſary that* Children *ſhould be early made ſenſible of the Scandal of telling a* Lye: *To that End* Parents *muſt inculcate upon them, betimes, that moſt neceſſary* Virtue *of ſpeaking* Truth, *as one of the beſt and ſtrongeſt Bands of* human Society *and* Commerce, *and the Foundation of all* Moral Honeſty.

5. Injuſtice (*I mean the Tricking each other in Trifles, which ſo frequently happens among* Children, *and is very often countenanced by the* Parents, *and looked on as the Sign of a very* promiſing Genius) *ought to be diſcouraged betimes, leſt it ſhould betray them into that vile Sin of* pilfering *and* purloining *in their riper Years*; *to which the grand Enemy of* Mankind *is not wanting to prompt them by his Suggeſtions, whenever he finds their Inclinations have a Tendency that Way.*

6. Immoderate Anger *and Deſire of* Revenge, *muſt never be ſuffered to take Root in* Children. *For* (*as a moſt Reverend* Divine *obſerves*) * "If "any of theſe be cheriſhed, or even let alone in "them, they will in a ſhort Time grow head- "ſtrong and unruly: and when they come to be "Men, will corrupt the Judgment, and turn "good Nature into Humour, and Underſtand- "ing into Prejudice and Wilfulneſs."

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* A. B. TILLOTSON.

7. Children *are very apt to ſay at* Home *what they ſee and hear at* School, *and oftentimes more than is true, and ſome* Parents, *as often, are weak enough to believe it. Hence ariſe thoſe great Uneaſineſſes between the* Parents *and the* Maſter, *which ſometimes are carried ſo high, as for the* Parent, *in the Preſence of the* Child, *to reproach him with hard Names, and perhaps with more abuſeful Language. On the Contrary,*

8. *If* Parents *would have their* Children *improve in their* Learning, *they muſt cauſe them to ſubmit to the little (imaginary) Hardſhips of the* School, *and ſupport them under them by ſuitable* Encouragements. *They ſhould not fall out with the* Maſter *upon every* idle Tale, *nor even give their* Children *the Liberty of expreſſing themſelves that way*; *but they ſhould, by all Means, inform them frequently,* '*That they ought to be good* Boys, *and learn their* Book, *and always do as their* Maſter *bids them, and that if they do not, they muſt undergo the Pain of Correction.*' *And it is very obſervable what a Harmony there is between the* Maſter *and the* Scholar, *when the latter is taught to love and have a good Opinion of the former*; *and then* With what Eaſe does the Scholar learn! With what Pleaſure does the Maſter communicate!

9. *The laſt Thing that I ſhall take Notice of is, That while the Maſter endeavours to keep* Peace, *good* Harmony, *and* Friendſhip *among his* Scholars, *they are generally taught the* Reverſe *at* Home. * "It is indeed but too common for *Children* to encourage one another, and be encouraged by their *Friends* in that Savage and Brutal Way of *Contention*, and to count it a hopeful Sign

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* TALBOT's Chriſtian Schoolmaſter.

" of *Mettle* in them to give the *laſt Blow*, if not
" the *firſt*, where-ever they are provoked; for-
" getting at the ſame Time, that to teach *Chil-*
" *dren* betimes to love and be good natured to
" others, is to lay early the true Foundation of
" an *honeſt Man*. Add to this, that *cruel Delight*
" which ſome are ſeen to take in tormenting and
" worrying ſuch poor *Animals* as have the Miſ-
" fortune to fall into their Hands. But *Children*
" ſhould not only be reſtrained from ſuch *barba-*
" *rous Diverſions*, but ſhould be bred up from the
" Beginning to an Abhorrence of them," and at the ſame Time be taught that great Rule of Humanity, *To do to others as we would they ſhould do to us.*

From what has been ſaid relating to the Management of Children *at* Home; *the Neceſſity of the* Parents *joining Hands with the* Schoolmaſter *appears very evidently. For when the* Maſter *commands his* Pupils *to employ their* leiſure Time *in getting ſome neceſſary Parts of* Learning; *their* Friends *ſhould not command them to forbear: And when they ought to be at* School *at the ſtated* Hours, *they ſhould not be ſent an Hour or two after, in the Time of* Health, *ſometimes with a* Lye *in their* Lips *to excuſe their* Tardineſs; *and ſometimes with an Order, and a brazen Front, to tell their* Maſter, Their Friends think it Time enough to come to School at Nine in the Morning, becauſe the Weather is a little Cold, or becauſe they muſt have their Breakfaſt firſt. *I ſay* Parents *ſhould not act ſo indiſcreetly, becauſe it clips the Wings of the* Maſter's *Authority: It makes* Boys *firſt deſpiſe and undervalue their* Teachers, *and then become unmannerly and impertinent to them; Correction for which,*

which, makes the Tutor *hated by the* Children, *and then there naturally follows either a total diſregard to* Buſineſs, *or a* general Careleſſneſs *in every Thing they do. And,*

While I am ſpeaking of the Education of Children, *I hope I ſhall be forgiven, if I drop a Word or two relating to the* fair Sex.——*It is a general* Remark *that they are ſo unhappy as ſeldom to be found either to* Spell, Write, *or* Cypher *well: And the Reaſon is very obvious; Becauſe they do not ſtay at their* Writing Schools *long enough. A Year's Education in* Writing *is, by many, thought enough for* Girls; *and by others it is thought Time enough to put them to it, when they are* Eighteen *or* Twenty Years *of* Age; *whereas by* ſad Experience, *both theſe are found to be, the one* too ſhort *a Time, and the other is* too late. *The firſt is a Time* too ſhort, *becauſe, when they are taken from the* Writing School, *they generally forget what they learnt, for want of* Practice: *And the other* too late, *becauſe then they are apt to look too forward, imagin all things will come of themſelves without any Trouble, and think they can learn a great deal in a little Time; and when they find they cannot compaſs their Ends ſo ſoon as they would, then every little* Difficulty *diſcourages them: And hence it is that* adult Perſons, *ſeldom improve in the firſt* Principles *of* Learning *ſo faſt as younger Ones. For a Proof of theſe, I appeal to every* Woman, *whether I am juſt in my* Sentiments *or not.—The* Woman *who has had a liberal* Education *this Way, knows the* Advantages *that ariſe from the ready Uſe of the* Pen; *and the* Woman *who has learnt little or nothing of it, cannot but lament the* Want *of it.* Girls *therefore ought to be* *put to the* Writing School *as early as* Boys, *and continued in it as long, and then it may reaſonably be expected that both* Sexes *ſhould be alike ready at their* Pen. *But for want of this, How often do we ſee* Women *when they are left to ſhift for themſelves in the melancholy State of* Widowhood (*and what* Woman *knows that ſhe ſhall not be left in the like* State?) *obliged to leave their* Buſineſs *to the Management of others; ſometimes to their great* Loſs, *and ſometimes to their utter* Ruin; *when on the contrary had they been ready at their* Pen, *could* Spell *well, and underſtand* Figures, *they might not only have ſaved themſelves from* Ruin, *but perhaps have been* Miſtreſſes *of a* good Fortune. *Hence then may be drawn the following, but moſt* natural Concluſion, *viz.* * " The Education of Youth is " of ſuch vaſt Importance, and of ſuch ſingular " Uſe in the Scene of Life, that it viſibly carries " its own Recommendation along with it: For " on it, in a great Meaſure depend all that we " hope to be; every Perfection that a generous " and well-diſpoſed Mind would gladly arrive at: " 'Tis this that ſtamps the Diſtinction of Man- " kind, and renders one Man preferable to ano- " ther: Is almoſt the very Capacity of doing " well; and remarkably adorns every Point of " Life." And as the great End of human Learning is to teach a Man to know himſelf, and thereby fit him for the Kingdom of Heaven: So he that knows moſt, conſequently is enabled to practiſe the beſt, and become an Example to thoſe who know but little, or are quite ignorant of their Duty. I am,

Your and your Childrens Well-wiſher,

THOMAS DILWORTH.

---

* WATTS's Eſſay.

TO MR. THOMAS DILWORTH,

ON HIS

Compendium of ARITHMETIC,

INTITLED,

The *Schoolmaſters Aſſiſtant.*

WHILE ſome, ſeducive of the riſing Age,
Expoſe for Hire the lewd and factious Page,
On ev'ry Stall appear the public Peſt,
Deep Bane inſtilling in the tender Breaſt;
Thou, Friend of moral as of ſocial Truth!
Employ'ſt thy Toils to mend our growing Youth.
Thy Cares, how worthy of the Good and Wiſe,
Impow'r the Embrio Genius firſt to riſe;
Make the dark Clues of Science plain to find,
And thro' its Mazes lead the pleaſur'd Mind.
E'en now afreſh, unweary'd in thy Pains,
For future Times thy recent Taſk remains:
By double Motives it aſſures to pleaſe,
The Youth's Inſtructor and the Tutor's Eaſe:
From darker Forms it clears encumber'd Rules,
And Learning makes the fit Delight of Schools.
Thy Labours, Friend, have found their juſt Succeſs,
And gen'ral Plaudits thy Deſert confeſs.
O may THIS WORK, nor THIS be found thy laſt,
No ſordid Pride o'erlook, or Envy blaſt,
Far as our Mother-Tongue extends, be known,
And grateful Pupils thy Aſſiſtance own.

MOSES BROWNE.

To Mr. Thomas Dilworth, *Author of The* Schoolmaſters Aſſiſtant.

S I R,

AS you was pleaſed to favour me with the Peruſal of Your *Schoolmaſters Aſſiſtant* in Manuſcript, which gave me a ſenſible Pleaſure; You have thereby obliged me, in Juſtice to your Merit, to give my humble Opinion upon it.— That a Work of *this Kind* has been long wanted, admits of no Diſpute. And I muſt confeſs, that you have treated the Subject ſo methodically, laid down the ſeveral Rules ſo very plain, yet conciſe, as muſt make this Book of general Uſe and Advantage: And I heartily wiſh you may meet with equal Encouragement in the Publication of this, as you did in your excellent *New Guide* to the *Engliſh Tongue*. I am, SIR,

London, 29th of
November,
1743.

Your ſincere Friend,

And humble Servant,

BRIGHT WHILTON.

To Mr. Thomas Dilworth, *on his* Schoolmaſters Aſſiſtant.

S I R,

I Have peruſed, with Pleaſure, Your *Schoolmaſters Aſſiſtant*, and give You my Thanks for your kind Endeavours to further the Improvement of Youth with greater Facility to the Tutor.

I am convinced, *that Piece* is well calculated to promote both, and therefore wiſh you the Succeſs due to ſo much uſeful Labour. I am,

S I R,

Twelve-Bell-Court
in *Bow Church-Yard*, 13 *Jan.*
1743.

Your Friend and Servant,

WILLIAM COLES.

To Mr. Thomas Dilworth, *on his Treatiſe of* ARITHMETIC, *intitled* The Schoolmaſters Aſſiſtant.

SIR,

IT is univerſally allow'd (in all Nations civiliz'd) that the Inſtruction of Youth is of the greateſt Importance, the Happineſs of every Individual, and Society in general thereon depending; and that it is of two Kinds, *viz.* To form the good Man and the good Scholar. To compleat the latter, thoſe Studies are chiefly to be purſu'd, which are adequate to the Diſpoſition of the Pupil, and to compleat the Man of Buſineſs he is deſign'd for: But I do not know any Buſineſs that can be well executed without ARITHMETIC. THIS therefore claims the firſt Place, and due Care of the Maſter, to inculcate and explain its Rudiments, which will not only ground the *Tyro*, but alſo give him ſome Glances of thoſe Beauties and Uſes, he may expect from his preſent Labours: Every Help then, that may gain the Maſter Time in the Diſcharge of his Duty, will (in conſequence) add to the Improvement of his Scholars: For which Uſe and Purpoſe, that THIS BOOK is well adapted, (having peruſ'd it ſome Time ago in Manuſcript) is the ingenuous Opinion of, *SIR*,

Gainſford-ſtreet, Shad-
Thames, Southwark,
the 9th of *May*, 1743.

Your reſpectful Friend and Servant,

WILLIAM MOUNTAINE.

To Mr. Thomas Dilworth, *Author of the* Schoolmaſters Aſſiſtant.

SIR,

I Have peruſ'd your *Book*, intitled, The *Schoolmaſters Aſſiſtant*, and readily recommend it as a *proper Companion*, for ſuch as are employ'd in teaching ARITHMETIC, as well as for thoſe who are deſirous of Improvement in that uſeful and neceſſary SCIENCE. I am,

SIR,

The Academy in
Little Tower-
ſtreet, 29 *March*,
1744.

Your humble Servant,

EM. AUSTIN.

WE whoſe Names are underwritten, having peruſed this Book, intitled, *The* SCHOOLMASTERS ASSISTANT, do recommend it to be uſed in Schools, for the ſpeedy Improvement of YOUTH in ARITHMETIC, as the only one for that Purpoſe, that hath yet been made public.

Charles Bellenger, *M. A. Lecturer of* Trinity, Minories, *and Maſter of the Free-School belonging to the Worſhipful Company of Brewers,* London.

James Dalton, *M. A. Maſter of the Boarding-School at* Stanmore, *in* Middleſex.

The Rev. Mr. Joſeph Willſon, *Maſter of the Free-School at* Nether Kebworth, *in* Leiceſterſhire.

The Rev. Mr. Richard Willſon, *Maſter of the Free-School at* Rutterworth, *in* Leiceſterſhire.

The Rev. Mr. Robert Willſon, *Maſter of the Free-School at* Warbleton, *in* Suſſex.

Francis Chapman, *Writing-Maſter and Accomptant, in* Shadwel.

Francis Hopkins, *Writing-Maſter and Accomptant, in* Cavendiſh-Court, *near* Devonſhire-Square.

John Loveday, *Schoolmaſter, at* Stepney.

Ebenezar Bramble, *Maſter of a Boarding-School in* New-Brentford.

William Mercer, *Writing-Maſter at* Maidſtone.

William Tully, *Maſter of the Boarding-School at* Stanmore, *in* Middleſex.

John Thorpe, *Writing-Maſter and Accomptant, at* St. Edmund's Bury, Suffolk.

Thomas Evans, *Schoolmaſter, at* Hampſtead.

Richard Aſtell, *Writing-Maſter at* Epſom.

Robert Pierſon, *Schoolmaſter in* Redcroſs-Street.

John Richardſon, *Schoolmaſter by* London-Wall.

George Watts, *Schoolmaſter in* Penny-Fields, Poplar.

Auguſtine Gradwell, *Maſter of Mr.* Worral's *Free-School, in* Cherry-Tree-Alley, Golden-Lane, St. Luke's.

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George Caffey, *Schoolmaſter in* Whitechapel.

Edward Rayne, *Maſter of the Haberdaſhers School at* Hoxton.

John Shortland, *Schoolmaſter in* St. Ann's Lane, *near* Alderſgate.

Francis Cartwright, *Schoolmaſter, near* Shoreditch-Church.

William Paulſon, *Schoolmaſter in* Norton-Falgate.

Jeremiah Walker, *Writing-Maſter and Accomptant, in* Old Gravel Lane, *near* Ratcliff Highway.

Henry Maſon, *Schoolmaſter at* St. George's Church, Southwark.

Henry Longman, *Schoolmaſter in* Fitcher's Court, Noble-ſtreet, *near* Cripplegate.

John Day, *Writing-Maſter and Accomptant, at* Doctors-Commons.

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Joſeph Miller, *Schoolmaſter, in* Street-lane, *near* Hutherſfield, Yorkſhire.

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Eraſmus Carter, *Schoolmaſter, in* Sutton's-Court, *within* Biſhopſgate.

Henry Michon, *Schoolmaſter, in* Red Lion-Market, *near* Golden-lane.

John Wingfield, *Schoolmaſter in* Bull *and* Mouth-ſtreet, *near* Alderſgate.

Joſeph Allen, *Schoolmaſter and Accomptant, in* White-croſs-ſtreet.

Joſeph Beaſing, *Writing-Maſter and Accomptant, at* Cheſhunt *in* Hertfordſhire.

John Canton, *M. A. Maſter of the Academy in* Spital-ſquare.

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Robert Sawell, *Maſter of the Boarding-School, at* Aſpley, *near* Woborn, Bedfordſhire.

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Robert Smith, *Writing-Maſter and Accomptant, at* Richmond, Surry.

William Shemeld, *Writing-Maſter and Accomptant at* Hampſtead *in* Middleſex.

Dennis Metherington, *Schoolmaſter at* Marſton *in* Lincolnſhire.

Robert Amoſs, *Writing-Maſter and Accomptant in* Ratcliff-highway, St. George's, Middleſex

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The Explication of ſome Marks *uſed in this* COMPENDIUM.

$=$ TWO Parallel Lines are the Marks of *Equality*; as, 12 *oz.* $=$ 1 *lb.* ſignifies that 12 Ounces are *equal* to 1 Pound.

$+$ Saint *George*'s Croſs ſignifies *more*, or *Addition*; as $4+2=6$: *i. e.* 4 *more* 2, are *equal* to 6.

$-$ A ſtraight Line ſignifies *leſs*, or *Subtraction*; as, $4-2=2$: *i. e.* 4 *leſs* 2, is *equal* to 2.

$\times$ Saint *Andrew*'s Croſs denotes *Multiplication*; as, $4\times 2=8$; *i. e.* 4 *multiplied* by 2, is *equal* to 8.

$\div$ ∺ A Line between two Points, or between 4 Points, is the Sign of *Diviſion*; as, $4\div 2$ or 4 ∺ $2=2$: *i. e.* 4 *divided* by 2, is *equal* to 2.

)(The reverſe Parentheſis denotes *Diviſion* alſo; as, 2)4(2: *i. e.* 4 *divided* by 2, is *equal* to 2.

$\frac{4761}{32}$ Numbers placed in a Fraction-like manner, do likewiſe denote *Diviſion*; the lower Number being the *Diviſor*, and the upper Number the *Dividend*.

:: Four Points, ſet in the middle of four Numbers, denote them to be proportional to one another, by the *Rule of Three*; as, 2 . . 4 : : 8 . . 16: that is, as 2 is to 4, ſo is 8 to 16.

N. B. *Some Maſters, inſtead of* Points *uſe long* Strokes *to keep the* Terms *ſeparate, but it is wrong to do ſo; for the two* Points *between the* firſt *and* ſecond Terms, *and alſo between the* third *and* fourth Terms, *ſhew that the two* firſt, *and two* laſt Terms *are in the ſame Proportion. And whereas* four Points *are put between the* ſecond *and* third Terms, *they ſerve to diſjoint them, and ſhew that the* ſecond *and* third, *and* firſt *and* fourth Terms *are not in the ſame direct Proportion to each other as are thoſe before mentioned.*

Apothe-

Explication *of ſome* Marks, *&c.*

Apothecaries Weights.	
℔	Pounds.
℥	Ounces.
ʒ	Drams.
℈	Scruples.
gr.	Grains.

Motion.	
°	Degrees.
′	Minutes.
″	Seconds.

$\overline{2+3}\times 5 = 25$, Signifies that the Sum of 2 and 3 *multiplied* by 5, is *equal* to 25.

$\overline{3-2}\times 5 = 5$, Signifies that the Difference between 3 and 2, *multiplied* by 5, is *equal* to 5.

$\surd$ *or* $\surd q$. Prefixt to any Number, ſuppoſes that the *Square-Root* of that *Number* is required. Sometimes it is the Sign of *Irrationality*, and ſignifies that the *Square-Root* of ſuch a *Number* can never be truly found.

$\surd c$. Prefixt to any Number, ſuppoſes that the *Cube-Root* of that *Number* is required. Sometimes it is the Sign of *Irrationality*, and ſignifies that the *Cube-Root* of ſuch a *Number* can never be truly found.

$3aa + 3a$, Signifies 3 times the *Square* of *a*, *more* 3 times *a*.

$3aae + 3eea + eee$, Signifies 3 times the *Square* of *a*, *multiplied* by *e*, *more* 3 times the *Square* of *e*, *multiplied* by *a*, *more* the *Cube* of *e*, as in the *Cube-Root*.

THE Schoolmaſters Aſſiſtant.

PART I.

Of Arithmetic in Whole Numbers.

The INTRODUCTION.

Of Arithmetic in general.

Q. *WHAT is* Arithmetic?

A. Arithmetic is the Art or Science of computing by Numbers, either Whole or in Fractions.

Q. *What is* Number?

A. Number is one or more Quantities, anſwering to the Queſtion, *How many?*

Q. *What is Arithmetic in* Whole Numbers?

A. Arithmetic in *Whole Numbers* or *Integers*, ſuppoſes its Numbers to be entire Quantities, and not divided into Parts.

Q. *What is Arithmetic in* Fractions?

A. Arithmetic in *Fractions*, ſuppoſes its Numbers to be the Parts of ſome entire Quantity.

Q. *How do you conſider Arithmetic with regard to* Art *and* Science?

A. Both in *Theory* and *Practice*.

Q. *What is* Theoretical Arithmetic?

A. Theoretical Arithmetic conſiders the Nature and Quality of Numbers, and demonſtrates the Reaſon of Practical Operations. And in this Senſe Arithmetic is a *Science*.

Q. *What is* Practical Arithmetic?

A. Practical Arithmetic is that which ſhews the Method of working by Numbers, ſo as may be moſt uſeful and expeditious for Buſineſs. And in this Senſe Arithmetic is an *Art*.

Q. *What is the Nature of all* Arithmetical Operations?

A. The Nature of all *Arithmetical Operations* is, by ſome Quantities that are given, to find out others that are required.

Q. *Which are the fundamental Rules in* Arithmetic?

A. Theſe Five; *Notation, Addition, Subtraction, Multiplication*, and *Diviſion*.

Of NOTATION.

Q. W*HAT is* Notation?

A. It is the *Art* of expreſſing *Numbers* by certain *Characters* or *Figures.*

Q. *What is the* Uſe *of* Notation?

A. Notation teaches to read and write Numbers by their true Value.

Q. *How many Sorts of* Characters *or* Figures *are Numbers uſually expreſſed by?*

A. Two, *viz.* The *Arabic Figures, and the Latin Letters.*

Q. *How are the* Arabic Figures *expreſs'd?*

A. The *Arabic Figures* are thus expreſs'd; *One* 1, *Two* 2, *Three* 3, *Four* 4, *Five* 5, *Six* 6, *Seven* 7, *Eight* 8, *Nine* 9, *Nought* or *Cypher* 0. And this is the *Notation* or reading and writing of every ſingle Figure.

Q. *How far may the Uſe of theſe* Figures *be extended?*

A. Theſe Ten *Characters* or *Figures* may be uſed to expreſs all manner of Numbers, from the leaſt to the greateſt, that can be conceived, even without End.

Q. *How many* Figures *are ſufficient to expreſs moſt ordinary Concerns?*

A. Nine; and therefore the Table of *Notation* commonly extends no farther than to *nine* Places.

Q. *Why does it conſiſt of* nine *Places, rather than of* eight *or* ten?

A. Becauſe they make up three *even* Periods.

Q. *What do you mean by a* Period?

A. A *Period* is a Quantity expreſs'd by three Figures, whereof the firſt to the right Hand ſignifies ſo many *Units*, or ſingle Things; the ſecond ſo many *Tens*; and the third ſo many *Hundreds.*

Q. *Why are three Figures called a* Period?

A. Becauſe if the Number be increaſed above *three* Places, there is ſtill the ſame periodical Return of the Value of thoſe Places, and every *third* Figure to the left Hand, will always be *Hundreds,* if it be never ſo far extended.

Q. *Is an* Unit *or* One, *a Number?*

A. An *Unit* is a Number, becauſe it may properly anſwer the Queſtion, *How many?*

Q. *Give an Example or two.*

A. How many *Gods* do we believe? The Anſwer is, *One.* How many *Sundays* in the Compaſs of a Week? Anſwer, *One.*

Q. *In what Nature or Proportion of Value, do* Numbers *increaſe from the* Units *Place, to the left Hand?*

A. By *Tens.*

Q. *How muſt they be read?*

A. From the left to the right Hand.

Q. *If* two Figures *are given to be read together, how muſt they be valued?*

A. The firſt Figure towards the right Hand is *Units,* and the next to that is ſo many *Tens*; as 89, *Eighty-nine.* Where 9 is the Place of *Units,* and 8 is the Place of *Tens*; for 8 *Tens* are properly called *Eighty.*

Q. *If* three Figures *or a* whole Period *be given, how is it to be valued?*

A. Beginning at the laſt Figure on the right Hand, I value them *Units, Tens, Hundreds*; as 789, *Seven Hundred, Eighty and Nine.*

Note 1, *As every* third Figure *from the Place of* Units, *bears the Name of* Hundreds: *So for any great Sum to be diſtinguiſhed into* Periods *(as in the following* Tables) *will be of good Uſe to the Learner, in the eaſier valuing and expreſſing that Sum.*

2. *There is alſo another ſort of* Periods, *which ſome diſtinguiſh thus,* viz. Millions, Millions *of* Millions, &c. *and others thus,* viz. Millions, Billions, Trillions, &c. *the* firſt *conſiſting of* 7 *Places, and each of the* reſt *but of* 6; *but as* Periods *of this Kind ſeldom or never occur in* Buſineſs, *it is ſufficient only, to mention them in this Place, without ſaying any thing further about them.*

TABLE I.

Third Period.			Second Period			Firſt Period.		
C Millions	*X Millions*	*Millions*	*C Thouſands*	*X Thouſands*	*Thouſands*	*Hundred.*	*Tens*	*Units*
								9
							8	9
						7	8	9
					9	7	8	9
				8	9	7	8	9
			7	8	9	7	8	9
		9	7	8	9	7	8	9
	8	9	7	8	9	7	8	9
7	8	9	7	8	9	7	8	9

TABLE II.

Third Period.			Second Period.			Firſt Period.		
C Millions	*X Millions*	*Millions*	*C Thouſands*	*X Thouſands*	*Thouſands*	*Hundreds*	*Tens*	*Units*
								4
							7	3
						9	6	5
					3	4	7	3
				4	8	9	1	3
			7	3	1	2	3	6
		3	1	2	7	1	4	8
	4	3	1	9	2	7	6	4
5	7	3	1	2	9	8	4	2

Note, See the Notation of Numbers by *Latin Letters,* in the *New Guide to the* Engliſh *Tongue,* p. 88.

EXAMPLES *for Practice.*

Write down in proper Figures the following Numbers, viz.

Twenty-nine.

Three Hundred and forty-eight.

Seven Thouſand, two Hundred and twenty-ſix.

One Thouſand, three Hundred and ninety.

Nineteen Thouſand, ſeven hundred and twenty-eight.

Four Hundred and twenty-ſeven Thouſand, three Hundred and ninety-ſix.

Nine Hundred and forty-two Thouſand, ſeven Hundred.

Four Millions, ſeven Hundred and eighty-nine Thouſand three Hundred and twenty-eight.

Seven Millions, nine Hundred and forty-two Thouſand, four Hundred and ſeventy-five.

Twenty-ſix Millions, three Hundred and fourteen Thouſand, one Hundred and ninety-five.

One Hundred and ninety-ſeven Millions, four Hundred and thirty-ſix Thouſand, one Hundred and ninety-one.

Seven Hundred and fourteen Millions, one Hundred and nineteen Thouſand, ſeven Hundred and four.

Write down in Words at Length the following Numbers, viz.

7 —— 19 —— 846 —— 7428 —— 61261 —— 370121 —— 7126172 —— 7468.218 —— 461272615.

Of ADDITION.

Q. WHAT *is the Uſe of* Addition?

A. Addition teacheth to bring ſeveral particular Numbers into one total Sum.

Q. *How many Sorts of* Addition *are there?*

A. Two, *viz. Simple* and *Compound.*

Of Simple ADDITION.

Q. *What is* Simple Addition?

A. Simple or *Single Addition,* is the adding of ſeveral Numbers together, whoſe Signification is the ſame; as 6 Yards and 8 Yards make 14 Yards.

Q. *If ſeveral Numbers are given to be added into one Sum, how are they to be placed?*

A. They muſt be placed in ſuch manner, that *Units* may ſtand under *Units*; *Tens* under *Tens,* &c. *Pounds* under *Pounds* *Shillings* under *Shillings,* &c.

Q. *How do you prove* Addition?

A. The beſt Way of proving *Addition* is to begin at the Top of the Sum, and reckon the Figures downward in the ſame

manne

manner that they were added upward; and if the ſecond Line or Sum Total be equal to the firſt, it is right.

EXAMPLES *for Practice.*

£	*Yds.*	*Gals.*	*Tons.*	*Hhds.*	*lb.*
4	43	764	3746	47476	461743
7	17	147	7416	73712	761710
3	19	384	3406	31819	476312
2	14	736	7198	41243	126712
1	37	197	3173	71208	310748
7	46	473	4731	70956	471381
6	23	382	1262	81461	704714
4	59	769	4731	31269	312624
7	94	367	7169	74196	781462

Miles.	*Leagues.*	*Years.*
4734736	46431734	347312484
3474312	71261374	168126312
4161322	12612714	718126191
7369138	31371261	731618191
3142618	74147312	312134716
4731216	47312614	171216198
4713147	74167571	312614712
3712612	31216126	171614712
7126981	31187412	312814795

Of Compound ADDITION.

Q. *What is* Compound Addition?

A. Compound Addition is the adding of ſeveral Numbers together, having divers Denominations.

1. *Of* MONY.

Q. *Which are the Denominations of* Engliſh Mony?

A. 4 Farthings make 1 Penny.
12 Pence —— 1 Shilling.
20 Shillings —— 1 Pound *Sterling.*

Q. *Are there no other Names of* Mony *uſed in* England?
A. Yes; ſuch as,

		£	*s.*	*d.*
A Moidore	=	1	7	0
A Guinea	=	1	1	0
A Half Guinea	=	0	10	6
A Crown	=	0	5	0
A Half Crown	=	0	2	6

☞ There are alſo ſeveral ſmaller Pieces which ſpeak their own Value; as, a *Six-pence, Four-pence, Three-pence, Two-pence, Penny, Halfpenny, Farthing.*

Note, *The following Pieces are only imaginary.*

		£	*s.*	*d.*
A Carolus	=	1	3	0
A Jacobus	=	1	5	0
A Mark	=	0	13	4
An Angel	=	0	10	0
A Noble	=	0	6	8

Q. *Are there not ſome* Tables *that may be learned by Heart?*
A. Yes; theſe following, called *Pence-Tables.*

d.		*s.*	*d.*	*s.*		*d.*
20	=	1	8	2	=	24
30	=	2	6	3	=	36
40	=	3	4	4	=	48
50	=	4	2	5	=	60
60	=	5	0	6	=	72
70	=	5	10	7	=	84
80	=	6	8	8	=	96
90	=	7	6	9	=	108
100	=	8	4	10	=	120
110	=	9	2	11	=	132
120	=	10	0	12	=	144

Note, 1. *Tho' I ſay theſe* Tables *may be learned by Heart, I do not ſay they* muſt; *for then, by the ſame* Rule, *it would be neceſſary to have* Tables *to every* Rule *in* Addition, *which no Body uſes, and not every one the* Pence-Tables; *becauſe, when they are learnt never ſo perfectly, their* Uſe *extends no farther than* Mony; *and, therefore, they may very well be omitted, and a better* Method *ſubſtituted in their room; I mean that of* Pointing, *which, I am ſure, is both* eaſier *and* ſafer, *to Beginners eſpecially. However, I choſe to ſet them down in their Place, that they, who approve of them, may uſe them: and they who do not, can eaſily omit them.*

2. *As all the Parts of* Addition *are built upon the ſame* Reaſon; *ſo the* Method *of* Pointing *may ſerve as a general* Rule, *when any* Denomination *is to be added.*

EXAMPLES.

£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
4	3	6	1	4	3	4	1	6½	14	12	1
1	7	8¼	3	8	1¼	1	2	7	17	11	2¾
2	7	4	1	2	6	3	1	4¼	19	12	1½
1	9	4½	3	4	7½	3	3	6	16	13	1¾
3	1	3¾	1	2	6	1	4	1½	12	13	6
1	2	1	3	2	8¼	3	1	2	14	12	7¼
4	7	6½	7	1	6	1	5	8½	19	13	4
3	1	9	4	1	7¾	3	1	2	12	11	6

£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
19	13	4	47	12	11	21	12	10½	12	13	10
12	11	6	17	10	11	31	11	11½	71	16	8
17	14	1½	17	10	4½	47	12	10¼	19	4	6¼
19	13	4½	31	12	6	19	11	4	12	3	1
12	11	6	11	19	4	31	12	6½	26	1	6
19	13	1¾	12	12	6¾	12	11	4¾	31	11	1
16	12	1	11	13	1	37	11	4	14	12	6¼
19	11	4¼	11	11	2¼	19	11	3	18	18	7

£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
44	12	6¼	21	11	11½	47	12	6½	47	11	3¼
31	18	1½	16	12	6	16	19	11¼	31	17	3
47	12	4	11	9	10½	17	12	10¼	17	13	11¾
14	12	10¾	16	12	4¼	19	12	10	18	14	10½
16	14	11	34	1	10	17	12	11¾	16	15	11
19	12	2	17	14	11¼	17	19	4½	17	14	3¼
16	11	3	71	3	8¾	47	13	6	11	18	6
17	12	1¼	16	1	4	72	18	6	17	17	3

A Mercer's Bill.

Bought of *George Baily, May* 17, 1761.

		s.	d.		£	s.	d.
9 *Yards of Silk* — — —	*at*	14	6	*per Yd.*	6	10	6
12 *Yards of flower'd Silk* —	*at*	16	8	——	10	0	0
16 *Yards of Sarſenet* — —	*at*	6	9	——	5	8	0
10 *Yards of Satten* — — —	*at*	9	6	——	4	15	0
15 *Yards of Brocade* — —	*at*	10	8	——	8	0	0
11 *Scarves* — — — —	*at*	2	0	*each*	1	2	0
14 *Yards of Genoa Velvet* —	*at*	17	4	*per Yd.*	12	2	8
10 *Yards of Luſtring* — —	*at*	5	2	——	2	11	8
				Sum			

A Woollen-Draper's Bill.

Bought of *Thomas Simmonds, June* 19, 1761.

		s.	d.		£	s.	d.
16 *Yards of Drugget* — —	*at*	7	0	*per Yd.*	5	12	0
12 *Yards of broad Cloth* — —	*at*	15	0	——	9	0	0
9 *Yards of black Cloth* — —	*at*	16	5	——	7	7	9
10 *Yards of Shalloon* — —	*at*	1	8	——	0	16	8
15 *Yards of Serge* — — —	*at*	1	10	——	1	7	6
7 *Yards of fine Spaniſh Black* —	*at*	18	0	——	6	6	0
16 *Yards of Frize* — — —	*at*	4	6	——	3	12	0
12 *Yards of ſuperfine Scarlet* —	*at*	18	0	——	10	16	0
				Sum			

A Linen-Draper's Bill.

Bought of *John Clay, July* 17, 1761.

		s.	d.		£	s.	d.
26 *Ells of Dowlas* — — —	*at*	1	4	*per Ell*	1	14	8
18 *Ells of Holland* -- — —	*at*	4	0	——	3	12	0
12 *Ells of Diaper* — — —	*at*	1	0	——	0	12	0
12 *Damaſk Napkins* — —	*at*	2	0	*each*	1	4	0
20 *Yards of printed Linen* —	*at*	2	0	*per Yd.*	2	0	0
10 *Yards of Cambric* — —	*at*	12	0	——	6	0	0
10 *Yards of Muſlin* — —	*at*	7	0	——	3	10	0
14 *Yards of Canvas* — —	*at*	3	4	——	2	6	8
				Sum			

A Grocer's

A Grocer's Bill.

Bought of *Thomas Hartley, May* 19, 1761.

		s.	d.		£	s.	d.
8 lb. *of Raiſins of the Sun*	*at*	0	5	*per* lb.	0	3	4
15 lb. *of Malaga Raiſins*	*at*	0	4½	——	0	5	7½
10 lb. *of Currants*	*at*	0	6½	——	0	5	5
11 lb. *of Sugar*	*at*	0	4½	——	0	4	1½
2 *Sugar Loaves, wt.* 15 lb.	*at*	0	9	——	0	11	3
13 lb. *of Rice*	*at*	0	3	——	0	3	3
5 lb. *of black Pepper*	*at*	1	6	——	0	7	6
10 Oz. *of Cloves*	*at*	0	10	*per oz.*	0	8	4

Sum

A Cheeſemonger's Bill.

Bought of *Daniel Bridge, July* 17, 1761.

		s.	d.		£	s.	d.
3 ***Glouceſterſhire Cheeſes, wt.*** **24 lb.**	*at*	0	4	*per* lb.	0	8	0
3 ***Warwickſhire*** — ***wt.*** **20 lb.**	*at*	0	3	——	0	5	0
1 ***Cheſhire*** — ***wt.*** **28 lb.**	*at*	0	4	——	0	9	4
½ ***Firkin of Butter*** — ***wt.*** **28 lb.**	*at*	0	6	——	0	14	0
1 ***Flitch of Bacon*** — ***wt.*** **6 *Sto.***	*at*	4	0	*p. Sto.*	1	4	0
7 lb. *of Cambridge Butter*	*at*	0	6	*per* lb.	0	3	6
9 lb. *of new Cheeſe*	*at*	0	4	——	0	3	0
7 lb. *of Cream-Cheeſe*	*at*	0	6	——	0	3	6

Sum

A Milliner's Bill.

Bought of *Jane Inman, Auguſt* 28, 1761.

		s.	d.		£	s.	d.
15 *Yards of ſilver Ribbon*	*at*	2	3	*per Yd.*	1	13	9
3 *Pair of fine Kid Gloves*	*at*	2	0	*p. Pair*	0	6	0
6 *Dozen of Iriſh Lamb ditto*	*at*	1	0	——	3	12	0
6 *Sarſenet Hoods*	*at*	4	6	*each*	1	7	0
15 *Fans, India Mount*	*at*	4	0	——	3	0	0
3 *Setts of Knots*	*at*	2	0	*per Sett*	0	6	0
16 *Yards of fine Lace*	*at*	10	0	*per Yd.*	8	0	0
20 *Pieces of Bobbin*	*at*	0	6	*per piece*	0	10	0

Sum.

A Carpenter's Bill.

Mr. *John Law*, Dr. to *John Brooks*, for Carpenter's Work and Materials, *viz.*

1761.		s.	d.		£	s.	d.
May 3	*For* 30 *Feet of Fir Timber, at*	0	3	*per Foot*	0	7	6
5	— 18 *whole Deals — at*	1	6	*each*	1	7	0
	— 16 *ſlit Deals — — at*	1	0	——	0	16	0
	— 4 *Hundred of ſix-penny Nails*			——	0	2	0
	— 3 *Hundred of ten-penny Nails*			——	0	2	6
	— 6 *Hundred of Brads — —*			——	0	1	6
21	— 18 *Days Work — at*	3	0	*per Day*	2	14	0
				Sum			

A Baker's Bill.

Mr. *Thomas Marriot*, Dr. to *James Barnet*, viz.

1761.			£	s.	d.
Feb.	4	*For a Peck of Bran — — — —*	0	0	3
		— *a fine Peck Loaf — — — —*	0	1	8
	13	— *a Peck of fine Flour — — — —*	0	1	8
	17	— *a Buſhel of Pollard — — — —*	0	1	0
	18	— *ſmall Bread — — — — —*	0	0	2½
		— *Yeſt — — — — — —*	0	0	1
		— *a half peck ſecond Loaf — — —*	0	0	9
	20	— *a quartern ſecond Loaf — — —*	0	0	4½
		Sum			

A Bill of Diſburſement.

1761.			£	s.	d.
Feb.	17	*Laid out in Lamb, ſeven Groats — —*			
	18	— *in Sallad, five Farthings — — —*			
	21	— *in Beef, nineteen Pence Halfpenny —*			
Mar.	7	— *in Parſnips, three Halfpence — —*			
	8	— *in Potatoes, a Groat — — — — —*			
	9	— *in Candles, ſeven Groats and three Pence — — — — —*			
	10	— *in Butter and Cheeſe, eight and twenty Pence — — — —*			
	12	— *in Breaa three and twenty Pence —*			
		Sum			

Suppoſe I am indebted, £ s. d.

To A, *twenty Pounds, ſeven Shillings and four Pence Farthing* — — — — —

— B, *nineteen Pounds, thirteen Shillings and ten Pence Halfpenny* — — — —

— C, *twelve Pounds, fourteen Shillings and ſeven Pence three Farthings* — — —

— D, *twenty-ſix Pounds, ſeventeen Shillings and four-pence Farthing* — — —

— E, *twenty-eight Pounds, thirteen Shillings and ſeven Pence three Farthings* — —

— F, *twenty-one Pounds, fifteen Shillings and five Pence Halfpenny* — — — —

— G, *five Pounds, ſix Shillings and ſeven Pence Farthing* — — — — — —

How much is the Debt? *Sum*

2. *Of* TROY-WEIGHT.

Q. *Which are the Denominations of* Troy-Weight?

A. 24 Grains make 1 Pennyweight.
20 Pennyweights 1 Ounce.
12 Ounces — 1 Pound.

Q. *What ſort of Things are weighed by this Weight?*

A. Gold, Silver, Jewels, Electuaries, Bread, and all Liquors.

Q. *What is the Standard for* Gold?

A. 22 *Carrats* of fine Gold, and 2 *Carrats* of Copper being melted together, are eſteemed the true Standard for *Gold* Coin.

Q. *What is a* Carrat?

A. A *Carrat* is not any certain Quantity or Weight, but the twenty-fourth Part of any Quantity or Weight.

Q. *What is the Standard for* Silver?

A. 11 *oz.* 2 *dwts.* of fine Silver, and 18 *dwts.* of Copper being melted together, are eſteemed the true Standard for *Silver*-Coin; called *Silver-Sterling.*

Note, *The Ounce of Silver being valued at* 5 Shillings, *one Pennyweight will be val*[illegible] *at three Pence, and the Grain at half a Farthing.*

EXAMPLES.

EXAMPLES.

Oz.	*dw.*	*gr.*
7	10	12
6	11	11
5	16	11
4	17	10
1	12	16
7	12	18
9	16	19
8	14	16
4	16	10
9	4	8

Oz.	*dw.*	*gr.*
7	13	12
6	11	14
9	12	17
4	16	13
7	11	14
6	19	12
7	13	16
3	19	14
5	9	8
6	12	13

lb.	*oz.*	*dw.*	*gr.*
4	10	12	11
3	11	16	12
1	4	16	19
3	3	11	17
4	1	16	14
3	3	16	11
7	11	16	10
6	4	13	15
5	11	14	13
9	10	15	14

lb.	*oz.*	*dw.*	*gr.*
7	10	12	10
3	4	16	13
3	7	12	11
1	1	18	16
3	11	16	12
4	3	16	21
3	3	13	11
3	7	18	19
9	8	19	9
7	11	12	8

3. *Of* AVOIRDUPOIS-WEIGHT.

Q. *Which are the Denominations of* Avoirdupois-Weight?

A. 16 Drams make 1 Ounce.
16 Ounces —— 1 Pound.
28 Pounds —— 1 Quarter of an Hundred Weight.
4 Quarters —— 1 Hundred Weight, or 112 Pounds.
20 HundredWt. 1 Ton.

Q. *What is the Uſe of* Avoirdupois-Weight?

A. Avoirdupois-Weight is uſed in weighing any Thing of a coarſe and droſſy Nature, as all Grocery and Chandlers Wares, and all Metals but *Silver* and *Gold.*

Q. *What is the Difference between a Pound* Avoirdupois, *and a Pound* Troy?

A. The Pound *Avoirdupois* is equal to 14*oz.* 11*dwts.* 15*gr.* and an half *Troy*; and the Pound *Troy* is equal to 13*oz.* 2*dr.* and an half, and $\frac{9322}{13999}$ *Avoirdupois.*

Q. *What other Denominations are there in this Weight?*

A. There are ſeveral other Denominations in *Avoirdupois-Weight*, in ſome particular Goods, and others only cuſtomary in ſome particular Places; as appears by the following Table.

TABLE.

TABLE.

	lb.
A Firkin of Butter is —	56
—— of Soap is — —	64
A Barrel of Pot Aſh is	200
—— Anchovies is —	30
—— Candles is — —	120
—— Figs, from — — to 2*C.* 3*qrs.* —	98
—— Soap is — — —	256
—— Butter is — —	224
—— Gunpowder is —	112
—— Raiſins is — —	112
A double Barrel of Anchovies — —	60
A Puncheon of Prunes is 10*C.* or 12*C.*	
A Fother of Lead is 19*C.* 2*qrs.*	
A Stone of Iron or Shot is	14
—— Butchers Meat is	8
A Gallon of Train Oil is	7½
A Faggot of Steel —	120

	lb.
A Burden of Gad Steel, or 9 Score	180
A Quintal of Fiſh in *Newfoundland* is —	100
A Stone of Glaſs is — —	5
A Seam of Glaſs is 24 Stone, or — — —	120
For Cheeſe and Butter.	
A Clove or half Stone is	8
A Wey in *Suffolk* is 32 Cloves, or —	256
—— *Eſſex* is 42 Cloves or	336
For Wool.	
A Clove is — — — —	7
A Stone is — — — —	14
A Tod is — — — —	28
A Wey is 6 Tod and 1 Stone, or — —	182
A Sack is 2 Weys, or —	364
A Laſt is 12 Sacks, or	4368

EXAMPLES.

T.	*C.*	*qr.*	*lb.*		*C.*	*qr.*	*lb.*		*lb.*	*oz.*	*dr.*		*lb.*	*oz.*	*dr.*
7	11	1	16		17	1	12		14	10	12		12	11	10
1	12	3	11		16	2	11		16	12	11		17	12	10
3	4	1	17		14	1	12		19	12	12		14	12	13
3	1	2	12		16	3	19		17	12	13		16	12	11
7	11	1	11		19	1	12		14	11	10		19	12	11
6	3	2	13		16	3	18		16	15	14		17	13	4
3	1	2	20		12	1	18		13	11	14		16	11	3
4	1	3	26		16	3	19		17	12	10		21	10	7

4. *Of* APOTHECARIES-WEIGHT.

Q. *Which are the Denominations of* Apothecaries-Weight?

A. 20 Grains make 1 Scruple.
3 Scruples —— 1 Dram.
8 Drams —— 1 Ounce.
12 Ounces —— 1 Pound.

Q. *What is the Uſe of* Apothecaries-Weight?

A. Apothecaries-Weight is ſuch as their *Medicines* are compounded by

Note 1. *The* Apothecaries *mix their* Medicines *by this Rule, yet buy and ſell their Commodities by* Avoirdupois-Weight.

2. *The* Apothecaries Pound and Ounce, *and the* Pound and Ounce Troy *are the ſame, only differently divided and ſubdivided.*

EXAMPLES.

℔.	℥.	ʒ.	℈.	gr.
3	11	7	2	19
1	3	4	1	13
0	1	7	2	12
1	2	6	2	11
2	1	3	1	12
1	2	4	0	11
7	10	3	1	16
1	7	6	1	15

℔.	℥.	ʒ.	℈.	gr.
7	1	3	1	10
0	1	2	1	14
7	3	4	1	12
6	1	1	2	11
0	0	3	2	17
0	1	0	0	10
0	1	2	0	10
0	3	7	2	19

℔.	℥.	ʒ.	℈.	gr.
7	3	1	2	11
6	2	7	1	14
3	7	2	1	11
1	3	1	0	10
2	1	2	1	12
1	3	1	2	11
4	3	1	2	11
7	3	2	1	13

5. *Of* LONG MEASURE.

Q. *Which are the Denominations of* Long Meaſure?

A.	3 Barly-Corns make	1 Inch.
	4 Inches —— ——	1 Hand.
	12 Inches —— ——	1 Foot.
	3 Feet —— ——	1 Yard.
	6 Feet —— ——	1 Fathom.
	5 Yards and a Half	1 Rod, Pole, or Perch.
	40 Poles —— ——	1 Furlong.
	8 Furlongs — ——	1 Mile.
	3 Miles —— ——	1 League.
	60 Miles —— ——	1 Degree.

Note, *A* Degree *is* 69 Miles, *and* 4 Furlongs, *very near, tho' commonly reckoned but* 60 Miles.

Q. *What is the Uſe of* Long Meaſure?

A. To meaſure Diſtance of Places, or any thing elſe, where *Length* is conſidered, without Regard to the Breadth.

Q. *Is the* Pole, *or* Perch, *always of the ſame Length?*

A. No.

Q. *What is the Difference?*

A. Five Yards and an Half are the Statute-Meaſure for a *Pole* or *Perch*; but for Fens and Wood-lands, it is cuſtomary to reckon 18 Feet to the Pole; and for Foreſts 21 Feet.

Q. *What is the Uſe of an* Hand?
A. It is uſed to meaſure Horſes.
Q. *What is the Uſe of a* Fathom?
A. It is uſed to meaſure Depths.

EXAMPLES.

M.	*f.*	*p.*	*Yds.*	*f.*	*in.*	*Le.*	*m.*	*f.*	*p.*	*Yds.*	*f.*	*in.*	*bc.*
17	7	19	14	2	7	17	2	6	14	16	1	0	0
16	1	14	16	0	4	12	1	1	18	14	2	10	1
19	3	16	19	1	10	16	2	1	16	17	1	4	2
17	4	19	16	2	4	19	2	7	11	13	2	11	1
12	1	11	14	2	5	19	0	4	31	16	1	7	2
18	3	16	14	2	1	17	2	1	12	17	1	4	1
19	7	14	31	1	3	12	1	2	17	19	2	6	2
16	6	26	11	0	1	17	1	1	14	19	2	1	1

6. *Of* CLOTH-MEASURE.

Q. *Which are the Denominations of* Cloth-Meaſure?
A. 2 Inches and a Quarter make 1 Nail.
4 Nails — — — — 1 Quarter of a Yard.
4 Quarters — — — 1 Yard.
3 Quarters of a Yard — 1 Flemiſh Ell.
5 Quarters of a Yard — 1 Engliſh Ell.

Note, 1. *The* Yard *is uſed in meaſuring all ſorts of* Woollen Cloths, wrought Silks, *moſt* Linens, Tape *and* Gartering.

2. *The* Ell Engliſh *is uſed only in meaſuring ſome particular* Linens, *called* Hollands.

3. *The* Ell Flemiſh *is uſed in meaſuring* Tapeſtry.

EXAMPLES.

Yds.	*qrs*	*na.*	*Ells*	*qrs.*	*na.*	*Yds.*	*qrs.*	*na.*	*E. F.*	*qrs.*	*na.*
17	1	1	14	1	2	17	2	1	17	1	2
11	3	1	17	3	1	16	3	3	17	1	3
16	1	2	14	4	1	17	1	2	14	1	2
19	3	1	16	3	2	19	2	1	16	2	0
17	1	2	19	1	1	17	3	2	14	0	0
12	3	3	17	2	3	16	1	3	19	2	1
19	1	1	16	3	1	19	2	1	17	2	2
14	2	3	15	1	2	27	1	2	16	1	3

7. *Of* LAND-MEASURE.

Q. *Which are the Denominations of* Land-Meaſure?

A. 9 Square Feet ——— ——— make 1 Yard.
30 Yards and a Quarter ——— —— 1 Pole.
40 Poles in Length and 1 in Breadth 1 Rood.
4 Roods ——— ——— —— 1 Acre.

Q. *What is the Uſe of* Land-Meaſure?

A. It gives the Content of any Piece of Ground in Acres.

EXAMPLES.

A.	*r.*	*p.*	*A.*	*r.*	*p.*	*A.*	*r.*	*p.*
17	3	12	17	1	12	26	1	36
11	2	19	11	2	13	13	2	22
15	1	21	16	3	27	23	3	13
16	1	12	19	1	16	36	2	28
17	2	11	12	3	14	22	2	33
13	2	12	16	1	11	19	0	19
11	1	17	17	3	14	33	3	16
21	3	21	12	1	11	17	2	24

8. *Of* LIQUID-MEASURE.

Q. *How many Sorts of* Liquid-Meaſure *are there?*

A. Two: *Wine-Meaſure* and *Wincheſter-Meaſure.*

Q. *What is meant by* Wincheſter-Meaſure?

A. It is a particular Meaſure uſed for Beer and Ale.

Q. *What is the Difference between* Wine-Meaſure *and* Wincheſter-Meaſure?

A. A Gallon of Wine is 231 ſolid Inches; but a Gallon of *Beer* or *Ale* exceeds that Meaſure by 51 Inches, and is 282 ſolid Inches.

(1) *Of* WINE-MEASURE.

Q. *Which are the Denominations of* Wine-Meaſure?

A. 2 Pints ——— — make 1 Quart.
4 Quarts —— ——— 1 Gallon.
10 Gallons —— ——— 1 Anchor of Brandy or Rum.
18 Gallons —— ——— 1 Runlet
31½ Gallons —— ——— 1 Barrel.
42 Gallons —— ——— 1 Tierce.
63 Gallons —— ——— 1 Hogſhead.
84 Gallons —— ——— 1 Puncheon.
2 Hogſheads — ——— 1 Pipe or Butt.
2 Pipes or 4 Hogſheads 1 Tun.

Q. *What other Liquors are meaſured by the* Wine-Standard ?

A. All Brandies, Spirits, Strong Waters, Perry, Cyder, Mead, Vinegar, Hony and Oil.

Note, Milk *is alſo retail'd by this* Standard, *not by* Law, *but* Cuſtom *only.*

EXAMPLES.

T.	*hhds.*	*gal.*	*qts.*	*Hhds.*	*gal.*	*qts.*	*Tier.*	*gal.*	*qts.*
7	1	12	2	27	10	2	27	12	1
6	3	31	3	22	13	3	29	17	3
7	1	41	2	26	11	3	22	11	2
6	2	17	1	29	12	2	27	31	3
7	3	14	3	23	22	0	29	12	1
1	2	19	1	27	32	2	27	11	2
9	1	15	2	29	27	3	26	17	1
3	1	11	2	26	33	2	22	11	3

(2.) *Of* WINCHESTER-MEASURE.

Q. *Which are the Denominations of* Wincheſter-Meaſure.

A. 2 Pints — — — make 1 Quart.
4 Quarts — — — — 1 Gallon.
8 Gallons — — — — 1 Firkin of Ale.
9 Gallons — — — — 1 Firkin of Beer.
2 Firkins — — — — 1 Kilderkin.
4 Firkins — — — — 1 Barrel.
1 Barrel and a Half, or 54 Gallons 1 Hogſhead of Beer.

Q. *What is the Difference between* Ale *and* Beer-Meaſure ?

A. In *London* only they compute 8 Gallons to the *Firkin* of *Ale*, and 32 Gallons to the *Barrel*; but in all other Parts of *England*, for *Ale*, *Strong Beer*, and *Small Beer*, 34 Gallons are computed to the *Barrel*, and 8 Gallons and an Half to the *Firkin*.

Q. *What other Commodities are there that go by the* Wincheſter-Meaſure ?

A. A Barrel of *Salmon* or *Eels* is 42 Gallons.
A Barrel of *Herrings* — 32 Gallons.
A Keg of *Sturgeon* — — 4 or 5 Gallons.
A Firkin of *Soap* — — 8 Gallons.

EXAMPLES.

Hds.	*gals.*	*qts.*	*B.B.*	*fir.*	*gal.*	*Hhds.*	*gals.*	*qts.*	*A.B.*	*fir*	*gal.*
7	12	1	23	3	3	26	17	1	23	1	7
6	27	2	27	2	6	13	19	2	24	2	6
3	21	2	29	3	7	21	16	3	27	1	5
2	11	1	27	2	8	31	18	2	27	3	4
3	17	2	26	1	5	27	10	1	26	3	2
2	12	1	37	1	4	31	18	2	27	1	3
6	17	3	27	1	3	26	31	1	26	2	1
7	31	2	32	2	2	31	26	2	29	2	0

9. *Of* DRY MEASURE.

Q. *Which are the uſual Denominations of* Dry Meaſure?

A. 2 Pints — make 1 Quart.
2 Quarts —— 1 Pottle.
2 Pottles —— 1 Gallon.
2 Gallons —— 1 Peck.
4 Pecks —— 1 Buſhel.
8 Buſhels —— 1 Quarter of Corn.
36 Buſhels —— 1 Chaldron of Coals.

Q. *Wherein does* London *differ from other Places in* England *in the* Coal Meaſure?

A. In *London* 36 Buſhels make a Chaldron; but in all other Places 32 Buſhels make a Chaldron. The Buſhel alſo in Water Meaſure contains 5 Pecks.

Q. *What other Denominations are there in* Dry Meaſure?

A. A Score of Coals — — is 21 Chaldrons.
A Sack of Coals — —— 3 Buſhels.
A Sack of Corn — —— 4 Buſhels.
10 Quarters of Corn make 1 Wey.
12 Weys are —— —— 1 Laſt.
A Load of Corn — — is 5 Buſhels.
A Cart-load ditto — —— 40 Buſhels.

Q. *What is the Uſe of* Dry Meaſure?

A. Dry Meaſure is applied to all dry Goods, as *Corn, Seeds, Fruit, Roots, Sand, Salt, Sea-Coal, Charcoal, Smallcoal, Oyſters, Muſcles* and *Cockles.*

Q. *What is the Standard for* Dry Meaſure?

A. The Standard for Dry Meaſure is a Wincheſter Buſhel, being 18 Inches and a Half wide throughout, and 8 Inches deep. One Gallon of this Quantity is 268 ſolid Inches and $\frac{4}{5}$, and conſequently is leſs than an Ale Gallon by 13 ſolid Inches and $\frac{1}{5}$.

EXAMPLES.

Ch.	*bu.*	*p.*	*Qrs.*	*bu.*	*p.*	*Ch.*	*bu.*	*p.*	*Qrs.*	*bu.*	*p.*
17	11	3	14	7	2	27	10	1	36	7	3
16	10	2	16	1	1	17	12	2	43	6	2
19	11	1	19	3	2	24	21	1	22	3	3
17	12	3	16	1	1	31	32	2	37	2	2
16	19	3	17	3	2	71	19	1	26	5	2
17	11	1	16	1	1	16	12	2	28	4	3
17	11	3	12	3	1	17	31	3	33	7	0
11	14	1	37	2	3	16	14	1	42	3	2

10. *Of* TIME.

Q. *Which are the Denominations of* Time?

A. 60 Seconds — — make 1 Minute.
60 Minutes — — — 1 Hour.
24 Hours — — — 1 Day.
7 Days — — — 1 Week.
4 Weeks — — — 1 Month.
13 Months, 1 Day, and 6 Hours, 1 common or Julian Year.

Q. *What is a* Solar Year?

A. According to the beſt Computations, a Solar Year is 365 Days, 5 Hours, 48 Minutes, and 55 Seconds.

Q. *How is the Year divided by the* Calendar?

A.
Thirty Days hath *September*,
April, *June*, and *November*,
All the reſt have Thirty-one,
Except *February* alone,
Which claimeth juſt Eight and a Score,
But every Leap Year one more.

EXAMPLES.

M.	*w.*	*d.*	*H.*	*m.*	*ſec.*	*M.*	*w.*	*d.*	*D.*	*h.*	*m.*	*ſec.*
14	1	6	17	10	32	31	2	1	17	11	13	16
17	2	5	17	22	21	17	1	6	19	12	16	11
16	1	3	14	21	32	17	3	4	17	12	17	13
19	3	2	4	2	3	16	1	2	14	13	26	31
16	1	1	7	3	1	17	2	1	13	12	11.	48
26	2	0	73	16	30	16	2	5	17	19	19	12
13	2	2	22	28	42	19	1	4	13	26	26	51

11. *Of* MOTION.

Q. *Which are the Denominations of* Motion in the heavenly Bodies?

A. 60 Seconds make 1 prime Minute.
60 Minutes —— 1 Degree.
30 Degrees —— 1 Sign.
12 Signs, or 360 Degrees, make the whole great Circle of the Zodiac.

EXAMPLES.

°.	′.	″.	°.	′.	″.	°.	′.	″.
71	10	16	47	17	19	46	17	31
12	11	19	17	10	38	17	36	18
17	16	13	12	11	41	13	11	12
19	11	26	13	10	16	16	19	12
17	48	51	26	17	12	17	12	10
13	12	11	73	19	12	16	12	10
17	16	11	16	81	32	17	19	17
57	16	17	21	32	41	31	26	43

12. *Of Things bought and ſold by the Tale.*

Q. *Which are the Denominations of Goods accounted by the* Tale?

A. 12 Particulars — make 1 Dozen.
12 Dozen —— —— 1 Groſs.
12 Groſs or 144 Dozen 1 great Groſs.

Examples are needleſs.

Queſtions to exerciſe ADDITION.

1. A Man was born in the Year 1702, I demand when he will be 57 Years of Age?

2. There are two Numbers whoſe Difference is 17, and the leſſer is 44; What is the greater Number?

3. A Man borrowed a Sum of Mony, and paid in Part 12*l.* 10*s.* and the Remainder is 17*l.* 10*s.* I demand the Sum borrowed?

4. *A* owes me three Guineas, *B* 50*l.* 12*s.* *C* 104*l.* *D* threeſcore and ſeventeen Pounds; How much is due to me in all?

5. *A*, *B*, and *C*, bought a Parcel of Goods, in the Purchaſe of which *A* laid out 3*l.* *B* 40*s.* and *C* 20*d.* How much was laid out in all?

6. A Man hath 6 Bags of Hops; the firſt weighs 2 *qrs.* 14 *lb.* and each of the reſt weighs 14 *lb.* more: What Quantity hath he in the Whole?

7. A Man took an Houſe for 12 Years; and by Agreement was to pay 100 *l.* 10 *s.* down; 190 *l.* 4 *s.* at the End of 6 Years; and 109 *l.* 6 *s.* at the End of 12 Years. I demand the whole Sum.

8. A Shopkeeper having opened a Shop, the firſt Week ſold Goods to the Value of threeſcore Pounds, the next Week he took fourſcore Pounds, but the third Week he took no more than thirty Shillings; How much did he receive in all?

Of SUBTRACTION.

Q. W*HAT is the Uſe of* Subtraction?

A. By taking a *leſs* Number from a *greater*, it ſhews the *Difference* between both.

Q. *How many ſorts of* Subtraction *are there?*

A. Two: *Simple* and *Compound.*

Of Simple SUBTRACTION.

Q. *What is* Simple Subtraction?

A. Simple or *Single Subtraction* is the finding a Difference between any two Numbers, whoſe Signification is the ſame; as the Difference between 6 Yards and 4 Yards, is 2 Yards.

Q. *How are Numbers to be placed in* Subtraction?

A. With *Units* under *Units*, *Tens* uuder *Tens*, &c. as in *Addition.*

Q. *What Rule have you for the Operation of* Subtraction *in general?*

A. When the lower *Number* is greater than the upper, take the lower *Number* from the *Number* which you borrow, and to that Difference add the upper *Number*, carrying one to the next lower Place.

Q. *What* Number *muſt you borrow, when the lower* Number *is greater?*

A. The ſame which you ſtop at in *Addition.*

Q. *How do you prove* Subtraction?

A. By adding the Remainder and the leſſer Line together, which will always be equal to the greater Line. Or,

By ſubtractiag the Remainder from the greater Line, and that Difference will always be equal to the leſſer Line.

EXAMPLES.

EXAMPLES.

	£	Yards.	Miles.	Days.	Months.
From	763	7694	41372	761214	7613471
Take	122	1867	13976	121812	2813126
	651				

	Hours.	lb.	Crowns.	Shillings.
From	31261812	312617127	71161871	7612641
Take	19879428	173121712	26571014	5910917

Of Compound SUBTRACTION.

Q. *What is* Compound Subtraction?

A. Compound Subtraction produces a Difference between any two Sums of divers Denominations.

I. Of MONY.

EXAMPLES.

	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
From	14	10	$6\frac{1}{2}$	36	12	$6\frac{1}{2}$	76	12	$4\frac{3}{4}$	31	18	$4\frac{1}{2}$
Take	3	17	$8\frac{1}{2}$	17	11	$2\frac{1}{4}$	17	13	$3\frac{1}{4}$	16	19	1
Diff.												

	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Bor.	41	15	3	76	3	$4\frac{1}{2}$	73	7	6	17	12	$1\frac{1}{2}$
Paid	14	17	$1\frac{1}{2}$	13	17	7	19	4	$1\frac{1}{2}$	14	7	2
Unpaid												

	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Lent	136	11	$6\frac{1}{4}$	47	17	6	413	11	$7\frac{3}{4}$	71	18	9
Rec.	76	12	$7\frac{3}{4}$	29	11	$6\frac{1}{4}$	171	18	$9\frac{1}{2}$	17	16	$10\frac{3}{4}$
Due												

Borrowed

	£	s.	d.
Borrowed	764	0	0
Paid at ſeveral Times.	13	1	1½
	17	4	2
	16	1	6¾
	21	2	1
	19	11	10
	26	13	5¼
	11	19	6½
	13	12	2½
Paid in all			
Unpaid			

	£	s.	d.
Lent	800	10	6
Received at ſeveral Times.	12	11	2¼
	19	12	6
	17	11	2½
	14	11	3
	19	12	2
	14	11	8¾
	17	16	2¼
	46	12	7¾
Received in all			
Remains due			

2. TROY-WEIGHT.

	Oz.	*dwt.*	*gr.*	*Oz.*	*dwt.*	*gr.*	*Oz.*	*dwt.*	*gr.*	*lb.*	*oz.*	*dw.*	*gr.*
From	71	11	12	71	12	18	13	16	12	84	4	11	12
Take	2	10	19	10	4	19	5	19	14	17	10	11	7
Diff.													

3. AVOIRDUPOIS-WEIGHT.

	C.	*qrs.*	*lb.*	*lb.*	*oz.*	*dr.*	*lb.*	*oz.*	*dr.*	*T.*	*C.*	*qr.*	*lb.*
Bou.	72	1	18	17	2	1	17	10	1	12	1	2	10
Sold	3	1	26	10	13	2	15	14	3	5	3	1	19
Unſold													

4. APOTHECARIES-WEIGHT.

	℥.	ʒ	℈.	gr.	℥.	ʒ.	℈.	gr.	℔.	℥.	ʒ.	℈.	gr.
From	65	4	2	10	47	5	1	16	48	3	2	0	19
Take	7	7	2	12	2	1	2	18	10	1	2	2	17
Diff.													

5. LONG-MEASURE.

	Le.	*m.*	*f.*	*p.*	*Yd.*	*f.*	*in.*	*b.c.*	*Le.*	*m.*	*f.*	*p.*
From	71	1	3	10	48	0	1	2	61	0	1	3
Take	14	2	5	16	12	0	3	1	17	1	2	20
Diff.												

6. CLOTH-MEASURE.

	Yd.	*qr.*	*na.*	*E.F.*	*qr.*	*na.*
Bou.	71	3	1	51	2	2
Sold	14	2	3	16	1	1
Unſold						

	Yd.	*qr.*	*na.*	*E.F.*	*qr.*	*na.*
From	47	2	1	17	1	2
Take	12	1	2	14	4	3
Diff.						

	Yds.	*qr.*	*na.*
A Draper bought	148	0	0
Sold at ſeveral Times	14	1	2
	17	3	3
	19	1	2
	16	1	1
	17	3	3
Sold in all			
Unſold			

7. LAND-MEASURE.

	A.	*r.*	*p.*	*A.*	*r.*	*p.*	*A.*	*r.*	*p.*	*A.*	*r.*	*p.*
Bought	12	1	10	17	3	17	28	1	7	32	0	9
Tilled	5	3	17	12	3	23	19	1	28	16	2	23
Untilled												

8. WINE-MEASURE.

	T.	*hds.*	*gal.*	*T.*	*hds.*	*gal.*	*Gals.*	*qts.*	*pts.*	*Gals.*	*qts.*	*pts.*
From	3	2	10	7	2	10	19	2	1	67	1	1
Take	1	3	19	5	2	28	12	1	1	12	3	0
Diff.												

9. WINCHESTER

9. WINCHESTER-MEASURE.

	Hds.	*gals.*	*qts.*	*A.B.*	*f.*	*gals.*	*B.B.*	*f.*	*gals.*	*Hds.*	*gals.*	*qt.*
Bou.	17	10	1	17	2	1	48	1	3	41	2	2
Sold	12	11	2	14	1	3	17	1	7	23	3	3
Unſold												

10. DRY MEASURE.

	Ch.	*bu.*	*p.*	*Ch.*	*bu.*	*p.*	*Qrs.*	*bu.*	*p.*	*Qrs.*	*bu.*	*p.*
From	17	2	1	40	1	2	19	1	1	26	1	3
Take	10	1	3	16	5	1	12	7	2	19	1	2
Diff.												

11. TIME.

	D.	*h.*	*m.*	*ſec.*	*W.*	*d.*	*h.*	*m.*	*ſec.*	*W.*	*d.*	*h.*	*m.*	*ſec.*
From	41	13	22	12	14	1	10	12	10	17	1	10	12	10
Take	22	16	33	31	10	3	19	48	26	10	2	14	6	15
Diff.														

12. MOTION.

	°	′	″	°	′	″	°	′	″
From	48	10	12	47	2	10	62	13	9
Take	19	11	16	12	19	46	49	18	33
Diff.									

Queſtions to exerciſe SUBTRACTION.

1. A Man was born in the Year 1702; I demand his Age in the Year 1761?

2. There are two Numbers, the greater Number is 61, and the leſſer Number is 44; I demand the Difference?

3. There are two Numbers, whoſe Difference is 17, and the greater Number is 61? I demand the leſſer Number?

4. The Brewer and the Baker drew Bills each upon the other: the Brewer ſtands indebted 45 *l.* 19 *s.* and the Baker 26 *l.* and 7 *d.* ½; who is the proper Perſon indebted, and how much?

5. A Man borrowed 30 *l.* and paid in Part 12 *l.* 10 *s.* I demand how much remains unpaid?

6. King *Charles* the Martyr, was beheaded in the Year 1648; how many Years is it ſince?

7. *A* is indebted to the Brewer the Sum of 109 *l.* 10 *s.* *B* owes him 94 *l.* 4 *s.* 10 *d.* $\frac{1}{2}$. how much does one owe more than the other?

8. What Sum is that, which taken from 100 *l.* leaves 48 *l.* 7 *s.* 6 *d.* $\frac{1}{2}$?

9. There were 4 Bags of Mony, containing as follows, *viz.* The firſt Bag 34 *l.* the ſecond Bag 50 *l.* the third Bag 100 *l.* and the fourth Bag 150 *l.* which were to be paid to ſeveral Perſons; but one of the Bags being loſt, there were but 234 *l.* paid; I demand which Bag was wanting?

Of MULTIPLICATION.

Q. WHAT *is* Multiplication?

A. It is a ſhort Way of performing ſeveral *Additions.*

Q. *How many Parts are there in* Multiplication?

A. Three, *viz.*

1. The *Multiplicand,* or Sum to be multiplied.
2. The *Multiplier,* or Sum multiplied by.
3. The *Product,* or Total of the *Multiplicand,* as often as there are Units in the *Multiplier.*

Note; *The* Multiplicand *and the* Multiplier, *are alſo called* Factors; *and the* Product, *the* Fact *or* Rectangle.

Q. *How many ſorts of* Multiplication *are there?*

A. Two, *viz.* *Simple* and *Compound.*

Of Simple MULTIPLICATION.

Q. *What is* Simple Multiplication?

A. *Simple Multiplication* is the multiplying of any two Numbers together, without reſpect to their Signification; as 7 times 8 is 56.

Note 1. *As* Addition *and* Subtraction *of* Integers *are called* Simple Addition, *and* Simple Subtraction; *ſo ſhould* Multiplication *and* Diviſion *of* Integers *be called* Simple Multiplication, *and* Simple Diviſion: *and that only ſhould be called* Compound Multiplication, *and* Compound Diviſion, *which hath Numbers of divers Denominations to be either* multiplied, *or* divided.

2. *The following* Table *muſt be learnt perfectly by Heart, before you can proceed any further.*

Th

The MULTIPLICATION TABLE.

3 times	3 is	9	5 times	6 is	30	11 times	3 is	33
	4	12		7	35		4	44
	5	15		8	40		5	55
	6	18		9	45		6	66
	7	21	6 times	6	36		7	77
	8	24		7	42		8	88
	9	27		8	48		9	99
4 times	4	16		9	54	12 times	3	36
	5	20	7 times	7	49		4	48
	6	24		8	56		5	60
	7	28		9	63		6	72
	8	32	8 times	8	64		7	84
	9	36		9	72		8	96
5 times	5	25	9 times	9	81		9	108

CASE I.

Q. *What do you obſerve in the* firſt Caſe *of* Multiplication?

A. That the Factors be placed one under another, in ſuch manner, that Units may ſtand under Units, Tens under Tens, *&c.* and then multiply as the Table directs.

EXAMPLES.

£	*Crowns.*	*Days.*	*Hours.*
47613127	47613174	71261812	71261312
2	3	4	5

Minutes.	*Years.*	*Gallons.*	*Ounces.*
73126184	71312674	31261267	47612312
6	7	8	9

Shillings.	*Yards.*	*Buſhel*.	*Ells.*
31261731	76138126	82365243	65423789
11	12	11	12

CASE 2.

Q. *What do you obſerve in the* ſecond Caſe *of* Multiplication?

A. 1. When the *Multiplier* conſiſts of more Figures than one, there muſt be made as many ſeveral *Products,* as there are Figures contained in the *Multiplier.*

2. Let the firſt Figure of every *Product* be placed exactly under its *Multiplier.*

3. Add theſe Products together, and their Sum will be the total *Product.*

Q. *How do you prove* Multiplication?

A. Multiplication and *Diviſion* do mutually prove each other; yet *Multiplication* may as truly be proved by itſelf, by inverting the Factors.

EXAMPLES.

Crowns.	*Days.*	*Weeks.*	*Pence.*
691861	129186	281216	181281
26	98	978	763
17988386	12660228	275029248	138317403

Ounces.	*Yards.*	*Pints.*	*Quarts.*
269181	261986	812617	281691
4629	7638	43859	76286
1246038849	2001049068	35640569003	21489079626

Q. *What* Exceptions *have you to this* Caſe?

A. 1. When theſe Figures 1 and 1, or 1 and 2, happen together in the Multiplier, you may multiply by both at once; as in Caſe 1.

EXAMPLES.

Weeks.	*Buſhels.*	*Grains.*	*Leagues.*
761312	671612	963458	843126
412	114	912	119
313660544	76563768	878673696	100331994

2. When any other Number between 12 and 20 happens, as 13, 14, 15, &c. then multiply by the Figure in Units Place, and as you multiply, add to the Product of each ſingle Figure that of the Multiplicand, which ſtands next on the t Hand.

EXAMPLES.

Gallons.	*Days.*	*Months.*	*lb.*
4721217	4713176	4731261	4713761
15	16	17	18

CASE 3.

Q. *What do you obſerve in the* third Caſe *of* Multiplication?

A. 1. Such *Factors* as have *Cyphers* at the Ends, muſt be ſet one under another, as if there were no *Cyphers*.

2. The *Cyphers* placed at the End of either, or both of the *Factors*, are to be omitted till the laſt Product, and then the ſame Number of *Cyphers* muſt be annexed to it.

EXAMPLES.

Pence.	*Hours.*	*Years.*
476000	180120	461210
170	8100	81900
80920000	8663772000	37773099000

Nails.	*Inches.*	*Barrels.*
760000	461200	618010
4800	72000	74210
3648000000	33206400000	45862522100

CASE 4.

Q. *What do you obſerve in the* fourth Caſe *of* Multiplication?

A. When *Cyphers* are placed between the ſignificant *Figures* in the *Multiplier*, they muſt be omitted in the Operation; regard being had to the firſt Figure of every particular *Product*, as before.

EXAMPLES.

Gallons.	*Eggs.*	*Buttons.*
128121	128128	246145
72001	70043	60012
9224840121	8974469504	14771653740

CASE 5.

Q. *How do you multiply by the* Parts *of any Number, inſtead of the* Whole?

A. When the *Multiplier* is ſuch a Number, that any two Figures, being multiplied together, will make the ſaid *Multiplier*, it is ſhorter to multiply the given Number by one of thoſe Figures, and that Product by the other; as 5 times 7 is 35.

EXAMPLES.

Pounds.	*Men.*	*Soldiers.*	*Sailors.*
764126	764131	461231	461312
35	48	72	36
26744410	36678288	33208632	16607232

Of Compound MULTIPLICATION.

Q. *What is* Compound Multiplication?

A. When ſeveral Numbers of divers Denominations are given to be multiplied by one common *Multiplier*; this is called *Compound Multiplication.*

£.	*s.*	*d.*	*lb.*	*oz.*	*dwt.*	*gr.*	*C.*	*qrs.*	*lb.*	*lb.*	*oz.*	*dr.*
17	3	1¼	17	5	12	16	43	1	14	17	12	10
		2				3			4			5

M.	*f.*	*p.*	*Yds.*	*f.*	*in.*	*b.c.*	*Yds.*	*qrs.*	*na.*	*B.B.*	*fir.*	*gal.*
16	4	21	17	2	3	1	16	3	2	17	2	3
		6				7			8			9

Ch.	*b.*	*p.*	*D.*	*h.*	*m.*	*ſec.*	*M.*	*w.*	*d.*	°.	'.	''.
16	12	3	17	14	14	15	16	3	4	16	11	13
		10				12			11			7

Note, *If the Learner be taught to turn back to the Bills of Parcels in* Addition, *he will find plenty of Examples in* Compound Multiplication.

Queſtions.

Queſtions to exerciſe MULTIPLICATION.

1. If one Man's Pay be 3 *s.* what muſt 40 Men have?

2. What is the Product of 76, multiplied by 3, and by 7?

3. There are 124 Men employed to finiſh a Piece of Work, and they are to have 3 *l.* each Man; I demand how much they muſt all have?

4. An Army of 10000 Men having plundered a City, took ſo much Mony, that when it was ſhar'd among them, each Man had 27 *l.* I demand how much Mony was taken in all?

5. There were 40 Men concern'd in the Payment of a Sum of Mony, and each Man paid 1271 *l.* how much was paid in all?

6. If one Foot contains 12 Inches, I demand how many Inches there are in 126 Feet?

7. What is the Product of 769, multiplied by 9 and by 7?

Of DIVISION.

Q. W*HAT is* Diviſion?

A. It is a ſhort Way of performing ſeveral *Subtractions*, and ſhews how oft one Number is contained in another, and what remains.

Q. *How many Parts are there in* Diviſion?

A. Four, *viz.*

1. The *Dividend*, or Sum to be divided.
2. The *Diviſor*, or Sum divided by.
3. The *Quotient*, or Anſwer to the Queſtion.
4. The *Remainder*, which is always leſs than the *Diviſor*, and of the ſame Name with the *Dividend*.

Note, *The* Diviſor, Dividend, *and* Quotient *are certain; but the* Remainder *is uncertain, becauſe ſome Operations in* Diviſion *have no Remainder.*

Q. *How many ſorts of* Diviſion *are there?*

A. Two; *Simple* and *Compound.*

Of Simple DIVISION.

Q. *What is* Simple Diviſion?

A. Simple Diviſion is, when the *Diviſor* and *Dividend* are made choice of, without any Regard to their Signification; as 56 divided by 7, gives 8 for the Quotient; or, the Number 7 is contained in 56, eight times.

Q. *How many ſorts of* Simple Diviſion *are there?*

A. Two; *Short Diviſion* and *Long Diviſion.*

Of Short DIVISION.

Q. *What is* Short Diviſion?

A. Short Diviſion is, when the *Diviſor* does not exceed 12.

EXAMPLES.

Minutes.	*Months.*	*Days.*
2)71313674(	6)312610841(	11)73126131071(
3)42310812(	7)713126719(	12)38126173141(
4)13812612(	8)701267131(	11)16127981311(
5)61231281(	9)126713108(	12)17312617121(

Q. *How is* Diviſion *proved?*

A. Multiply the *Diviſor* and *Quotient* together, and the *Remainder* (if there be any) add to the Product; that Sum will be equal to the *Dividend.*

Of Long DIVISION.

CASE 1.

Q. *What is* Long Diviſion?

A. When the *Diviſor* is more than 12, for help of the Memory, we are obliged to multiply the *Quotient* Figure and *Diviſor* together, and ſubtract that Product from the *Dividend*, in order to find out the *Remainder*; which Operation muſt be continued to every *Quotient* Figure: And this is called *Long Diviſion.*

EXAMPLES.

Yards.	*Shillings.*	*Pence.*
91)71265871(	28)71261714(	1217)31917312(
82)31712617(	19)73126171(	3164)12697126(
73)17312618(	381)13261714(	6128)71217312(
64)47312617(	773)31746173(	2912)47161231(
55)73181061(	937)13189714(	33108)91261814(
46)76131714(	761)12816171(	71216)17131716(
37)31231712(	7618)189173 12(	86257)34175362(

CASE 2.

Q. *What do you obſerve of* Cyphers *placed at the End of the* Diviſor?

A. They muſt be cut off; and the ſame Places alſo muſt be cut off in the *Dividend.*

2. Thoſe Figures which are cut off in the *Dividend*, muſt be annexed to the *Remainder* at laſt.

EXAMPLES.

Yards.	*Crowns.*
625|00)712613|12(	128|000)71126|071(
426|00)713121|74(	412|000(716131|181(

CASE

CASE 3.

Q. *How do you divide by the* Parts *of any Number inſtead of the* Whole ?

A. When the *Diviſor* is ſuch a Number that any two Figures, being multiplied together, will make the ſaid *Diviſor*, it is ſhorter to divide the given Number by one of thoſe Figures, and that *Quotient* by the other ; as 5 times 7 is 35.

EXAMPLES.

Pence	*Crowns.*	*Pounds.*
35)26744410(	48)36678288(	72)33208632(

Of Compound DIVISION.

Q. *What is* Compound Diviſion ?

A. When ſeveral Numbers of divers Denominations are given to be divided by one common *Diviſor* ; this is called *Compound Diviſion.*

EXAMPLES.

l. s. d.	*lb. oz. dwt. gr.*	*T. C. qr. lb.*
2)48 12 6½(	3)14 10 3 16(	4)17 1 1 14(
lb. oz. dr.	*M. f. p.*	*Yds. f. in. b.c.*
5)46 12 10(	6)38 2 14(	7)46 0 10 2(
Yds. qrs. na.	*A.B. fir. gal.*	*Ch. bu. p.*
8)16 2 2(	9)17 3 2(	10)20 13 2(
M. w. d.	*D. h. m. ſec.*	°. ′. ″.
11)48 2 2(	12(46 16 12 30(	12)33 4 11(

Queſtions to exerciſe DIVISION.

1. If 140*s.* be divided amongſt 40 Men, how much a-piece ?

2. If 1596 be divided by 21, what is the Quotient ?

3. There are 124 Men, who have 372*l.* among them, how much muſt each Man have ?

4. An Army of 19000 Men having plundered a City, took 266000*l.* how much muſt each Man have ?

5. There was a certain Number of Men concern'd in the Payment of 1272*l.* and each Man paid 3*l.* I demand the Number of Men ?

6. What is the Quotient of 48447, divided by 9 and by 7 ?

7. If 3264 be divided by 12 and by 4, what is the Quotient ?

8. A certain Man intending to go a Journey of about 3264 Miles, would complete the ſame in 136 Days ; I demand how many Miles he muſt travel each Day ?

Of REDUCTION.

Q. W*HAT is* Reduction?

A. Reduction is the bringing or reducing Numbers of one Denomination into other Numbers of another Denomination, but of the ſame Value.

Q. *How are Denominations of any kind reduc'd from one to another?*

A. By *Multiplication* and *Diviſion.*

Q. *When is* Multiplication *to be uſed?*

A. When great Names are to be brought into ſmall; as *Pounds* into *Shillings*, or *Days* into *Hours*; and this is called *Reduction Deſcending.*

Q. *When is* Diviſion *to be uſed?*

A. When ſmall Names are to be brought into great; as *Shillings* into *Pounds*, or *Hours* into *Days*; and this is called (through improperly) *Reduction Aſcending.*

Note, *Whether you* multiply *or* divide, *it muſt be by as many of the* leſs, *as make one of the* greater *Denomination.*

Q. *How are Queſtions in* Reduction *proved?*

A. By varying the Order of them.

Of MONY.

REDUCTION *Deſcending.*

1. In 46*l.* how many *Shillings* and *Pence?* *Anſw.* 920*s.* 11040*d.*

46*l.*
20
———
920*s.*
12
———
11040*d.*
———

2. In 7*l.* how many *Shillings* and *Pence?* *Anſw* 140*s.* 1680*d.*

3. In 9*l.* how many *Shillings*, *Pence* and *Farthings?* *Anſw* 180*s.* 2160*d.* 8640*qrs.*

4. In 7*l.* 14*s.* 6*d.* ¼, how many *Farthings?* *Anſw* 7417*qrs.*

5. Reduce 46*l.* 14*s.* 9*d.* ¾, into *qrs.* *Facit* 44871 *qr*

6. Reduce 50*l.* 9*s.* 9*d.* ½, into *Half-pence.* *Facit* 2423 *Half-pence.*

7. Reduce 160*l.* 15*s.* 6*d.* into *Six-pences.* *Facit* 643 *Six-pences.*

8. Reduce 48 *l.* 12 *s.* 8 *d.* into *Groats.* *Facit* 2918 *Groats.*

9. Reduce 90 *l.* 17 *s.* 6 *d.* into *Two-pences.* *Facit* 10905 *Two-pences.*

10. In 12 *Crowns*, how many *Shillings* and *Pence?* *Anſw.* 60 *s.* 720 *d.*

11. In 15 *l.* how many *Crowns* and *Shillings?* *Anſw.* 60 *Cr.* 300 *s.*

12. In 50 *Half-Crowns*, how many *Pence* and *Farthings?* *Anſw.* 1500 *d.* 6000 *qrs.*

13. In 306 *Crowns*, how many *Half-Crowns* and *Pence?* *Anſw.* 612 *Half-Cr.* 18360 *d.*

14. Reduce 120 *Six-pences*, into *Three-pences*, *Pence* and *Farthings.* *Facit*, 240 *Three-pences*, 720 *d.* 2880 *qrs.*

15. Reduce 210 *Crowns* into *Shillings*, *Groats* and *Pence.* *Facit* 1050 *s.* 3150 *Groats*, 12600 *d.*

16. Reduce 86 *Pounds* into *Crowns*, *Shillings* and *Groats.* *Facit*, 344 *Cr.* 1720 *s.* 5160 *Groats.*

17. How many *Shillings* and *Pence* are in 17 *Guineas?* *Anſw.* 357 *s.* 4284 *d.*

18. How many *Crowns* and *Six-pences* are in 28 *Pounds?* *Anſw.* 112 *Cr.* 1120 *Six-pences.*

REDUCTION *Aſcending.*

1. In 11040 *d.* how many *Shillings* and *Pounds?* *Anſw.* 920 *s.* 46 *l.*

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            2|0
12)1104|0(92|0(46 l.
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2. In 1680 *d.* how many *Shillings* and *Pounds?* *Anſw.* 140 *s.* 7 *l.*

3. In 8640 *qrs.* how many *Pence*, *Shillings* and *Pounds?* *Anſw.* 2160 *d.* 180 *s.* 9 *l.*

4. In 7417 *qrs.* how many *Pounds?* *Anſw.* 7 *l.* 14 *s.* 6 *d.* $\frac{1}{4}$.

5. Reduce 44871 *qrs.* into *Pounds.* *Facit*, 46 *l.* 14 *s.* 9 *d.* $\frac{3}{4}$.

6. Reduce 24235 *Half-pence* into *Pounds.* *Facit*, 50 *l.* 9 *s.* 9 *d.* $\frac{1}{2}$.

7. Reduce 6431 *Six-pences* into *Pounds.* *Facit*, 160 *l.* 15 *s.* 6 *d.*

8. Reduce 2918 *Groats* into *Pounds.* *Facit*, 48 *l.* 12 *s.* 8 *d.*

9. Reduce 10905 *Two-pences* into *Pounds.* *Facit*, 90 *l.* 17 *s.* 6 *d.*

10. In 720 *d.* how many *Shillings* and *Crowns?* *Anſw.* 60 *s.* 12 *Cr.*

11. In 300 *s.* how many *Crowns* and *Pounds?* *Anſw.* 60 *Cr.* 15 *l.*

12. In 6000 *qrs.* how many *Pence* and *Half-Crowns?* *Anſw.* 1500 *d.* 50 *Half-Crowns.*

13. In 18360*d.* how many *Half-Crowns* and *Crowns?* *Anſw* 612 *Half Cr.* 306 *Cr.*

14. Reduce 2880 *qrs.* into *Pence, Three-pences* and *Six-pences* *Facit,* 720*d.* 240 *Three-Pences,* 120 *Six-pences.*

15. Reduce 12600*d.* into *Groats, Shillings* and *Crowns* *Facit,* 3150 *Gr.* 1050*s.* 210 *Cr.*

16. Reduce 5160 *Groats* into *Shillings, Crowns* and *Pounds* *Facit,* 1720*s.* 344 *Cr.* 86*l.*

17. How many *Shillings* and *Guineas* are in 4284 *Pence?* *Anſw.* 357*s.* 17 *Guineas.*

18. How many *Crowns* and *Pounds* are in 1120 *Six-pences?* *Anſw.* 112 *Cr.* 28*l.*

REDUCTION *Aſcending and Deſcending.*

1. In 720 *Shillings,* how many *Pence* and *Crowns?* *Anſw* 8640*d.* 144 *Cr.*

720*s.*
12
———
6|0)864|0(144 *Crowns.*

2. In 120 *Shillings,* how many *Crowns* and *Half-Crowns?* *Anſw.* 24 *Cr.* 48 *Half Cr.*

3. In 60 *Crowns,* how many *Shillings* and *Pounds?* *Anſw* 300*s.* 15*l.*

4. In 612 *Half Crowns,* how many *Crowns* and *Pence?* *Anſw.* 306 *Cr.* 18360*d.*

5. In 40 *Guineas,* how many *Shillings, Crowns* and *Pounds?* *Anſw.* 840*s.* 168 *Cr.* 42*l.*

6. Reduce 12600 *Pence,* into *Shillings, Groats* and *Crowns* *Facit,* 1050*s.* 3150 *Gr.* 210 *Cr.*

7. Reduce 63 *Crowns,* into *Shillings* and *Guineas.* *Facit,* 315*s.* 15 *Guineas.*

8. Reduce 70 *Moidores* into *Pounds.* *Facit,* 94*l.* 10*s.*

9. Reduce 12180 *Three-pences,* into *Shillings, Pence,* and *Groats.* *Facit,* 3045*s.* 36540*d.* 9135 *Gr.*

10. How many *Crowns, Groats,* and *Pounds,* are in 1720*s* *Anſw.* 344 *Cr.* 5160 *Gr.* 86*l.*

11. How many *Groats, Three-pences* and *Six-pences* are in 121 *Shillings?* *Anſw.* 363 *Gr.* 484 *Three-pences,* 242 *Six-pences.*

12. How many *Pounds* and *Crowns,* are in 1120 *Six-pences* *Anſw.* 28*l.* 112 *Cr.*

13. How many *Crowns, Half-Crowns* and *Shillings,* are in 280*l.* and the Number of each equal? *Anſw.* 658, and 7*s.* over.

14. Fou

14. Four Men brought each 17 *l.* 10 *s.* value in Gold into the Mint to be coined into *Guineas*, how many muſt they have? *Anſw.* 66 *Guineas*, 14 *s.*

15. There are 12 Purſes with each 12 *Guineas*, how much *Sterling* is the Sum? *Anſw.* 151 *l.* 4 *s.*

16. A certain Ground-Tenant was behind with his Landlord for 16 Years Rent, at 5 *l.* 10 *s.* a Year, how much was the Debt? *Anſw.* 88 *l.*

17. There are 34 *l.* 17 *s.* to be divided among 17 Men, how much is it a-piece? *Anſw.* 2 *l.* 1 *s.*

18. In 19 *Moidores*, how many *Pounds Sterling*? *Anſw.* 25 *l.* 13 *s.*

Of TROY-WEIGHT.

1. In 47 *lb.* 10 *oz.* how many *Grains*? *Anſw.* 275520 *gr.*

2. In 47128 Grains of Gold, how many *lb.*? *Anſw.* 8 *lb.* 2 *oz.* 3 *dwts.* 16 *grs.*

3. In 10 *lb.* of Silver, how many Spoons, each 5 *oz.* 10 *dwts.*? *Anſw.* 21 *Spoons*, and 90 *dwts.* over.

4. In 4560 Grains of Gold, how many Tea-Spoons, each half an Ounce? *Anſw.* 19 *Tea-Spoons.*

5. In 47 Salvers, each 20 *oz.* how many *lb.*? *Anſw.* 78 *lb.* 4 *oz.*

6. How many Porringers, each 11 *oz.* are in 19 *lb.* 10 *oz.* 11 *dwts.* of Silver? *Anſw.* 21 *Porringers*, and 151 *dwts.* over.

7. A Goldſmith having 3 Ingots of Silver, each weighing 27 *oz.* was minded to make them into Spoons of 2 *oz.* Cups of 5 *oz.* Salts of 1 *oz.* and Snuff-boxes of 2 *oz.* and to have an equal Number of each; the Queſtion is, what was that Number? *Anſw.* 8 of each Sort, and 1 *oz.* over.

8. In 17 Ingots of Silver, each 27 *oz.* 10 *dwts.* how many Grains? *Anſw.* 224400 *gr.*

Of AVOIRDUPOIS-WEIGHT.

Q. *Which are the* Allowances *uſually made in* Avoirdupois *great Weight to the Buyer?*

A. They are *Tare*, *Trett* and *Cloff.*

Q. *What is* Tare?

A. Tare is an Allowance made to the *Buyer*, for the Weight of the *Box*, *Bag*, *Veſſel*, or whatever elſe contains the Goods bought; and is either,

1. At ſo much *per Bag*, *Barrel*, *Box*, &c.
2. At ſo much *per Cent.* or
3. At ſo much in the *Groſs* Weight, called *Invoice* Tare.

Q. *What is* Trett?

A. Trett is an Allowance, made by the Merchant to the Buyer, of 4 *lb.* in 104 *lb.* that is, the ſix and twentieth Part for Waſte and Duſt, in ſome ſort of Goods.

Note, *If an Allowance be made both for* Tare *and* Trett, *in the ſame Parcel of Goods, the* Tare *is firſt to be deducted; and that Remainder is called* Suttle Weight.

Q. *What is* Cloff?

A. Cloff is an Allowance of 2 *lb.* Weight to the Citizens of *London,* on every Draught above 3 *C.* Weight, on ſome ſorts of Goods; as *Galls, Madder, Sumac, Argol,* &c.

Q. *What are theſe Allowances called beyond the Seas?*

A. They are called the *Courteſies of London*; becauſe they are not practiſed in any other Place.

Q. *What is* Groſs Weight?

A. Groſs is the Weight of any Sort of Merchandize, and that which contains it, being weighed both together.

Q. *What is* neat Weight?

A. Neat is the pure Weight of the Goods, after all Allowances are deducted.

Note 1, Raw, Long, Short, China, Morea-Silk, *&c. are weighed by a great Pound of* 24 oz. *But* Ferret, Filoſella, Sleeve-Silk, *&c. by the common Pound of* 16 oz.

2. *To bring great Pounds into common, multiply by* 3, *and divide by* 2.
3. *To bring common Pounds into great, multiply by* 2, *and divide by* 3.

CASE I.

1. In 7 *C.* 3 *qrs.* 10 *lb.* how many *Oz.* and *Drams?* *Anſw.* 14048 *oz.* 224768 *dr.*

2. In 3 Tons of Iron, how many *C. qrs.* and *lb.?* *Anſw.* 60 *C.* 240 *qrs.* 6720 *lb.*

3. In 14048 *oz.* how many *C.?* *Anſw.* 7 *C.* 3 *qrs.* 10 *lb.*

4. In 6720 *lb.* of Iron, how many Tons? *Anſw.* 3 *Tons.*

5. In 461 great Pounds of Morea-Silk, how many Oz. and *Drams?* *Anſw.* 11064 *oz.* 177024 *dr.*

6. In 40426 Drams of Silk, how many great Pounds? *Anſw.* 105 *great Pounds,* 6 *oz.* 10 *dr.*

7. In 3 *lb.* of Cinnamon, how many Parcels, each 12 *oz.?* *Anſw.* 4 *Parcels.*

8. In 470 Parcels of Sugar, each 26 *lb.* how many *C.?* *Anſw.* 109 *C.* 0 *qrs.* 12 *lb.*

9. In 672 great Pounds of Silk, how many common Pounds? *Anſw.* 1008 *common lb.*

10. In 480 common Pounds of Silk, how many great Pounds? *Anſw.* 320 *great lb.*

11. In 8 Hogſheads of Tobacco, each weighing neat 7 *C.* $\frac{1}{2}$, how many Pounds? *Anſw.* 6720 *lb.*

12. In 17 Pigs of Lead, each weighing 4 *C.* $\frac{3}{4}$, how many Fother at 19 *C.* $\frac{1}{2}$? *Anſw.* 4 *Fother,* 2 *C.* 3 *qrs.*

13. In 712 *C.* of Lead, how many Fother? *Anſw.* 36 *Fother,* 10 *C.*

14. In 17 *C.* 1 *qr.* 6 *lb.* of Sugar, how many Parcels, each 17 *lb.*? *Anſw.* 114 *Parcels.*

CASE 2.

Of TARE *and* TRETT, *&c.*

Q. *When the* Tare *is at ſo much* per Barrel, Bag, *&c. how is the* Neat Weight *found?*

A. Multiply the Number of the ſaid *Barrels, Bags,* &c. by the Tare, and ſubtract that Product from the *Groſs*; the Remainder is the *Neat.*

Note, 1. *The Table of Allowances for* Tare *in the Book of Rates, ſays;*

For CYPRUS *and* SMYRNA *Silk,*

			lb.
Bales	*about or above* 300 *lb.*	*The Tare per Bale is*	16
	from 300 *to* 200		14
	from 200 *downwards.*		12

For VIRGINIA *Tobacco.*

Hhds.	5 *C. and upwards*	*The Tare per Hhd. is*	100
	from 5 *to* 4 *C.*		90
	from 4 *to* 3 *C.*		80
	under 3 *C.*		70

Sugar from INDIA.

In Caſks and Caniſters	*Tare*	$\frac{1}{6}$
In Cheſts and Caſks from St. Thome		$\frac{1}{5}$

Oil from CANDIA.

Tare 29 *lb. per Barrel.*

2. 7 *lb.* $\frac{1}{2}$ *of Oil make a Gallon; therefore to reduce* Pounds *into* Gallons, *multiply by* 2, *and divide by* 15.

EXAMPLES.

1. In 16 Hogſheads of Tobacco, each 5 *C.* 1 *qr.* 19 *lb.* Groſs, Tare *per* Hogſhead 100 *lb.* how much Neat Weight? *Anſw.* 72 *C.* 1 *qr.* 20 *lb.*

C. *qr.* *lb.*
5 1 19
4 *by the Parts.*

21 2.20
4

Groſs 86 2 24
Tare 14 1 4

Neat 72 1 20

16
100
——4 C. *qr.* *lb.*
28)1600(57(14 1 4

2. In 70 Bales of *Smyrna* Silk, each 317 *lb.* Groſs, Tare *per* Bale 16 *lb.* how many *lb.* Neat? *Anſw.* 21070 *lb. Neat.*

3. In 14 Hogſheads of Tobacco, weighing Groſs 89 *C.* 3 *qrs.* 17 *lb.* Tare *per* Hogſhead 100 *lb.* how much neat Weight? *Anſw.* 77 *C.* 1 *qr.* 17 *lb.*

4. What is the Neat Weight of 30 Bales of *Cyprus* Silk, each weighing 249 *lb.* Groſs, Tare *per* Bale 14 *lb.*? *Anſw.* 7050 *lb.*

CASE 3.

Q. *When the* Tare *is at ſo much* per Cent. *how is the* Neat Weight *found?*

A. When the *Tare* is an aliquot Part or Parts of the *C.* Weight, divide the whole Groſs by the ſaid *Part* or *Parts*, that the Tare is of an *C.* Weight, and the Quotient thence ariſing, gives the *Tare* of the Whole; which ſubtract from the whole *Groſs*, the Remainder is *Neat*.

Note, 1. *Figs*, *Almonds*, *Argol*, &c. - - - - 14 *lb.* }
Caroteels, *Butts of Currans*, &c. - - - 16 } per Cent.
Oil in uncertain Caſks, *&c.* - - - - 18 }

2. *Whatever Part the given* Tare *is of an* C. *Weight, the ſame muſt the whole* Tare *be of the given* Groſs Weight.

EXAMPLES.

1. What is the Neat Weight of 12 Barrels of Argol, Groſs 48 C. 3 *qrs.* 12 *lb.* Tare 14 *lb. per Cent.*? *Anſw.* 42 C. 3 *qrs.*

C. *qrs.* *lb.*
14=⅛)48 3 12 *Groſs.*
6 0 12 *Tare.*

42 3 0 *Neat.*

2. In 12 Butts of Currans, each 7 *C.* 1 *qr.* 10 *lb.* Groſs, Tare *per Cent.* 16 *lb.* how much Neat Weight? *Anſw.* 75 *C.* 1 *qr.* 26 *lb.* 14 *oz.*

3. What is the Neat Weight of 30 Barrels of Figs, each 2 *C.* 3 *qrs.* Groſs, Tare *per Cent.* 14 *lb.*? *Anſw.* 72 *C.* 21 *lb.*

Note, *When the* Tare *is not the aliquot Part or Parts of an* C. *Weight, then multiply the* Pounds Groſs *by the* Tare per Cent. *given, and that Product divide by* 112, *the Quotient is the whole* Tare: *which ſubtract from the* Groſs, *the Remainder is* Neat.

4. What is the Neat Produce of 20 Barrels of Anchovies, each Groſs 33 *lb.* Tare *per Cent.* 10 *lb.*? *Anſw.* 601 *lb.* 2 *oz.*

5. What is the Neat Produce of 17 Barrels of Pot-Aſh, each Groſs 203 *lb.* Tare 10 *lb. per Cent.*? *Anſw.* 3142 *lb.* 14 *oz.*

CASE 4.

Q. *When the* Tare *is at ſo much in the whole* Groſs Weight; *how is the* Neat Weight *found?*

A. Subtract the *Tare* from the *Groſs*, and the *Remainder* is *Neat*.

EXAMPLES.

1. What is the Neat Weight of 38 Hogſheads of Tobacco, weighing Groſs 201 *C.* 3 *qrs.* 12 *lb.* Tare in the Whole 3140 *lb.*? *Anſw.* 173 *C.* 3 *qrs.* 8 *lb.*

2. What is the Neat Weight of 3 Hogſheads of Tobacco, weighing as follows, *viz.*

		C.	*qrs.*	*lb.*		*lb.*
Nº 1	—	3	1	2	Tare	80
2	—	3	2	1		80
3	—	5	1	12		100?

Anſw. 9 *C.* 3 *qrs.* 7 *lb.*

CASE 5.

Q. *How is the* Neat Weight *found, when* Trett *is allowed with* Tare?

A. Divide the *Pounds Suttle* by 26, the Quotient is the *Trett*, which ſubtract from the *Suttle*, the Remainder is *Neat*.

EXAMPLES.

1. In 8 *C.* 3 *qrs.* 20 *lb.* Groſs, Tare 38 *lb.* Trett 4 *lb. per* 104 *lb.* how many *lb.* Neat? *Anſw.* 925 *lb. Neat.*

2. In 177 *C.* 0 *qrs.* 22 *lb.* Groſs, Tare 9 *lb. per Cent.* Trett 4 *lb. per* 104 *lb.* how many C. Weight Neat? *Anſw.* 156 *C.* 2 *qrs.* 22 *lb.*

3. In 17 Cheſts of Sugar, weighing 120 *C.* 2 *qrs.* Groſs, Tare 176 *lb.* Trett 4 *lb. per* 104 *lb.* how many C. Weight Neat? *Anſw.* 114 *C.* 1 *qr.* 12 *lb.*

Note, *There are other Allowances, not ſo common, ſuch as* Break, *which is at ſo much* per *Barrel, Bag, &c. and* Damage, *which is ſo much in the Whole, but they are very eaſy.*

Of APOTHECARIES-WEIGHT.

1. In 12 ℔. 1 ℥. 2 ʒ. 0 ℈. 1 gr. how many Grains? *Anſw.* 69721 *Grains.*

2. In 69721 Grains, how many ℈. ʒ. ℥. and ℔.? *Anſw.* 12℔. 1℥. 2ʒ. 0℈. 1gr.

Of LONG MEASURE.

1. In 70 Miles, how many Furlongs and Poles? *Anſw.* 560 *Furlongs*, 22400 *Poles.*

2. In 40 Yards, how many Feet, Inches, and Barly-corns? *Anſw.* 120 *Feet*, 1440 *Inches*, 4320 *Barly-corns.*

3. In 5 Miles, how many Barly corns? *Anſw.* 950400 *Barly-corns.*

4. In 4000 Inches, how many Yards? *Anſw.* 111 *Yds.* 4 *In.*

5. In 4 Leagues, how many Yards? *Anſw.* 21120 *Yards.*

6. In 15840 Yards, how many Miles and Leagues? *Anſw.* 9 *Miles*, 3 *Leagues.*

7. How many Barly-corns in a Mile? *Anſw.* 190080 *Barly-corns.*

8. How many times doth the Wheel, which is 18 Feet 6 Inches round, turn between *London* and *York*, which is 150 Miles? *Anſw.* 42810 *times, and* 180 *Inches over.*

9. How many Barly-corns will reach round the Globe of the Earth, which is 360 Degrees, and each Degree 69 Miles and an Half? *Anſw.* 4755801600 *Barly-corns.*

Of CLOTH-MEASURE.

1. In 14 Yards, how many Quarters and Nails? *Anſw.* 56 *Qrs.* 224 *Nails.*

2. In 17 *Yds.* 1 *qr.* 2 *na.* how many Nails? *Anſw.* 278 *Nails.*

3. In 4712 Nails, how many Yards? *Anſw.* 294 *Yds.* 2 *qr*

4. In 47128 Nails of *Iriſh* Cloth, how many Pieces, each 12 Yards? *Anſw.* 245 *Pieces*, 5 *Yards*, 2 *Quarters.*

5. In 4 Pieces of Cloth, each 14 Yards, how many Quarters and Nails? *Anſw.* 224 *Qrs.* 896 *Nails.*

6. In 10 Bales of Cloth, each 10 Pieces, each 12 Yards, how many Yards? *Anſw.* 1200 *Yards.*

7. In 7000 Nails of Holland, how many Ells? *Anſw.* 350 *Ells.*

8. Reduce 42 Ells into Quarters and Nails. *Facit*, 210 *Qrs.* 840 *Nails.*

Of LAND-MEASURE.

1. In 40 Acres, how many Roods and Perches? *Anſw.* 160 *Roods*, 6400 *Perches.*

2. In 17 *A.* 3 *r.* 10 *p.* how many Perches? *Anſw.* 2850 *Pers.*

3. Reduce 2850 Perches into Acres. *Facit*, 17 *A.* 3 *r.* 10 *p.*

4. If a Piece of Ground contains 24 Acres, and an Incloſure of 17 Acres 3 Roods be taken out of it, how many Perches are there in the Remainder? *Anſw.* 1000 *Perches.*

5. One Field contains 7 Acres, another 10 Acres, and a third 12 Acres 1 Rood, how many Shares, of 76 Perches each, are contained in the Whole? *Anſw.* 61 *Shares, and* 44 *Perches over.*

9. *Of* LIQUID MEASURE.

1. In 17 Gallons, how many Quarts and Pints? *Anſw.* 68 *Qts.* 136 *Pints.*

2. In 10 Barrels of Beer, how many Gallons and Quarts? *Anſw.* 360 *Gals.* 1440 *Qts.*

3. In 4 Barrels of Ale, how many Gallons? *Anſw.* 128 *Gals.*

4. In 72 Hogſheads of Beer, how many Barrels? *Anſw.* 108 *Barrels.*

5. In 91 Barrels of Beer, how many Hogſheads? *Anſw.* 60 *Hhds.* 36 *Gals.*

6. If a Back contains 30 Barrels of Beer, how many Gallons doth it hold? *Anſw.* 1080 *Gals.*

7. In 4 Tuns of Oil, how many Hogſheads, Gallons, and Quarts? *Anſw.* 16 *Hhds.* 1008 *Gals.* 4032 *Qts.*

8. In 3 Hogſheads of Brandy, how many half Anchors? *Anſw.* 37 *half Anchors,* 4 *Gals.*

9. In 1712 Gallons of Wine, how many Hogſheads? *Anſw.* 27 *Hhds.* 11 *Gals.*

10. If a Vintner be deſirous to draw off a Pipe of Canary into Bottles, containing Pints, Quarts, and two Quarts, and of each an equal Number, how many muſt he have? *Anſw.* 144 *of each Sort.*

Of DRY MEASURE.

1. In 40 Quarters of Wheat, how many Buſhels and Pecks? *Anſw.* 320 *Buſh.* 1280 *Pecks.*

2. Reduce 1280 Pecks of Wheat into Quarters. *Facit* 40 *Qrs.*

3. In 30 Chaldrons of Coals, each 36 Buſhels, how many Pecks? *Anſw.* 4320 *Pecks.*

4. Reduce 7094 Pecks of Coals into Chaldrons. *Facit,* 49 *Chal.* 9 *Buſh.* 2 *Pecks.*

Of TIME.

1. In 121812 Seconds, how many Hours? *Anſw.* 33 *Hrs.* 50 *Min.* 12 *Sec.*

2. Reduce 41 Weeks into Days, Hours, and Minutes. *Facit* 287 *Days,* 6888 *Hrs.* 413280 *Min.*

3. Reduce 413280 Minutes into Weeks. *Facit* 41 *Weeks.*

4. How many Seconds in a Year, allowing it to be 365 Days, 6 Hours? *Anſw.* 31557600 *Seconds.*

5. How many Days have paſſed ſince the Birth of Chriſt, to Chriſtmas 1760? *Anſw.* 642840 *Days.*

6. From *March* 2 to *November* 19 following (incluſive) how many Days? *Anſw.* 263 *Days.*

Of MOTION.

1. In half a Year's Time the Sun makes his Progreſs thro' 6 Signs of the Zodiac, how many Degrees, Minutes, and Seconds, doth that amount to? *Anſw.* 180 *Degrees,* 10800 *Min.* 648000 *Sec.*

Of the SINGLE RULE *of* THREE.

Q. HOW *many Parts are there in the Rule of* Three?

A. Two: *Single* or *Simple*, and *Double* or *Compound.*

Q. *By what is the* Single Rule *of* Three *known?*

A. By *three Terms*, which are always given in the Queſtion to find a *Fourth.*

Q. *Are any of the* Terms *given to be reduced from one* Denomination to another?

A. If any of the given *Terms* be of ſeveral *Denominations*, they muſt be reduced into the loweſt *Denomination* mentioned.

Q. *What do you obſerve concerning the* firſt *and* third Terms?

A. They muſt be of the ſame Name and Kind.

Q. *What do you obſerve concerning the* fourth Term?

A. It muſt be of the ſame Name and Kind with the *Second.*

Q. *What do you obſerve of the three given* Terms *taken together?*

A. That the two firſt are a *Suppoſition*, the laſt is a *Demand.*

Q. *How is the* third Term *known?*

A. It is known by theſe, or the like Words, *What coſt? How many? How much?*

Q. *How many Sorts of* Proportion *are there?*

A. Two: *Direct* and *Inverſe.*

1. *Of* DIRECT PROPORTION.

Q. *What is* Direct Proportion?

A. Direct Proportion is when *more* requires *more*, or *leſs* requires *leſs.*

Q. *What do you mean by* more requires more?

A. More requires more is when the third Term is *greater* than the firſt; and therefore requires the fourth Term to be *greater* than the ſecond in the ſame Proportion.

Q. *What do you mean by* leſs requires leſs?

A. Leſs requires leſs is when the third Term is leſs than the firſt; and therefore requires the fourth Term to be *leſs* than the ſecond in the like Proportion.

Q. *How is the fourth* Term *in* Direct Proportion *found?*

A. By multiplying the ſecond and third Terms together, and dividing that Product by the firſt Term.

Q. *What Proportion does the fourth Number bear to any other?*

A. It bears the ſame Proportion to the Second, as the Third does to the Firſt.

Q. *How do you prove Queſtions in the* Rule *of* Three Direct?

A. By changing their Order.

EXAMPLES.

1. If 3 *Oz.* of Silver coſt 17*s.* what will 48 *Oz.* coſt? *Anſw.* 13*l.* 12*s.*

Oz. *s.* *Oz.*
3 : 17 : : 48
17
——— 2|0 *l.* *s.*
3)816(27|2(13 12

2. If 3 *lb.* of Ginger coſt 3 *s.* what coſt 26 *lb.*? *Anſw.* 1 *l.* 6 *s.*

3. If 2 *oz.* of Silk coſt 2 *s.* 6 *d.* what coſt 7 *lb.*? *Anſw.* 7 *l.*

4. If 1 Gallon of Ale coſt 8 *d.* what coſt 36 Gallons? *Anſw.* 1 *l.* 4 *s.*

5. If 1 *lb.* of Sugar coſt 4 *d.* $\frac{1}{2}$, what coſt 48 *lb.*? *Anſw.* 18 *s.*

6. If 1 *lb.* of Sugar coſt 4*d.* what coſt 1 *C.*? *Anſw.* 1*l.* 17*s.* 4*d.*

7. If an *C.* of Sugar coſt 2 *l.* 12 *s.* what coſt 1 *lb.*? *Anſw.* 5*d.* 2 *qrs.* $\frac{32}{112}$.

8. If 1 Gallon of Beer coſt 4*d.* what coſt a Barrel? *Anſw.* 12*s.*

9. If 1 Pair of Stockings coſt 2 *s.* 3 *d.* what coſt 19 Dozen Pair? *Anſw.* 25 *l.* 13 *s.*

10. If 19 Dozen Pair of Shoes coſt 25 *l.* 13 *s.* what coſt 1 Pair? *Anſw.* 2 *s.* 3 *d.*

11 Bought a Firkin of Butter, containing 56*lb.* for 18*s.* 8*d.* what is that *per lb.*? *Anſw.* 4*d.*

12. Sold 3 *C.* Weight of Tobacco, at 18*d. per lb.* what is the Price of the Whole? *Anſw.* 25 *l.* 4 *s.*

13. Bought 19 Chaldrons of Coals, at 29*s.* 6*d. per* Chaldron, what come they to? *Anſw.* 28 *l.* 0 *s.* 6 *d.*

14. If 1 *lb.* of Sugar coſt 9 *d.* what coſt 17 C. 2 *qrs.*? *Anſw.* 73 *l.* 10 *s.*

15. If 1 *oz.* of Silver coſt 5 *s.* 6 *d.* what is the Price of a Tankard that weighs 1 *lb.* 10 *oz.* 10 *dwts.* 4 *grs.*? *Anſw.* 6*l.* 3 *s.* 9 *d.* 2 *qrs.* $\frac{96}{480}$.

16. If 1 *lb.* of Tobacco coſt 15 *d.* what coſt 3 *hhds.* weighing together 15 *C.* 1 *qr.* 19 *lb.*? *Anſw.* 107 *l.* 18 *s.* 9 *d.*

17. If a Yard of Cloth is worth 14 *s.* what is the Worth of 5 Pieces, each 19 Yards? *Anſw.* 66*l.* 10*s.*

18. If an Ell of Holland coſt 4*s.* 6*d.* what is the Value of 5 Pieces, each 12 Ells? *Anſw.* 13 *l.* 10 *s.*

19. If a Buſhel of Coals coſt 10*d.* how many Chaldrons for 100*l.*? *Anſw.* 66 *Ch.* 24 *Buſh.*

20. How many Quarters of Corn for 40 Guineas, at 4*s.* *per* Buſhel? *Anſw.* 26 *Qrs.* 2 *Buſh.*

21. If a Man's Yearly Income be 300*l.* what is it *per* Day? *Anſw.* 16*s.* 5*d.* 1*qr.* $\frac{15}{365}$.

22. If a Man ſpend 7 *Pence per* Day, how much is that in a Year? *Anſw.* 10*l.* 12*s.* 11*d.*

23. If a Pint of Wine coſt 10*d.* what coſt 3 *hhds.*? *Anſw.* 63*l.*

24. If a Pipe of Canary coſt 40*l.* how much is that *per* Pint? *Anſw.* 9*d.* 2 *qrs.* $\frac{96}{1008}$.

25. Bought 12 Pieces of Cloth, each 12 Yards, at 10*s.* 6*d.* *per* Yard, what come they to? *Anſw.* 75*l.* 12*s.*

26. What coſt 120 Yards of Cloth, at 3*s. per* Yard? *Anſw.* 18*l.*

27. A Merchant bought 4 Pieces of Holland, each 12 Ells, for 7*l.* 10*s.* what did 1 Ell coſt? *Anſw.* 3*s.* 1*d.* $\frac{1}{2}$.

28. A Grocer bought 3 *Hbds.* of Sugar, each 10 *C.* 3 *qrs.* 12 *lb.* Groſs, Tare 26 *lb. per hhd.* at 2*d.* $\frac{1}{2}$ *per lb.* I demand what the 3 *hhds.* came to? *Anſw.* 37*l.* 3*s.* 9*d.*

29. How much muſt I pay for the Carriage of 10 *C.* $\frac{1}{2}$, at the Rate of 1*d.* $\frac{1}{2}$ *per lb.*? *Anſw.* 7*l.* 7*s.*

30. If 6 Horſes eat up 21 Buſhels of Oats in a Week's Time, how many Buſhels will ſerve 20 Horſes the ſame Time? *Anſw.* 70 *Buſh.*

31. If a Family of 10 Perſons ſpend 3 Buſhels of Malt in a Month, how many Buſhels will ſerve them, when they are 30 in Family? *Anſw.* 9 *Buſh.*

32. If an Ingot of Silver weighs 36 *oz.* 10 *dwts.* what is it worth, at 5*s. per oz.*? *Anſw.* 9*l.* 2*s.* 6*d.*

33. How many Yards of Lace for 100*l.* at 3*s.* 6*d. per* Yard? *Anſw.* 571 *Yds.* $\frac{18}{42}$.

34. If a Merchant hath owing to him 1000*l.* and his Debtor doth agree to pay him for every Pound 12*s.* 6*d.* I demand how much he muſt pay in all? *Anſw.* 625*l.*

35. A Goldſmith ſold a Tankard for 10*l.* 12*s.* at the Rate of 5*s.* 4*d. per oz.* I demand the Weight of it? *Anſw.* 39 *oz.* 15 *dwts.*

36. A Man bought a Piece of Cloth for 16*l.* 10*s.* at 15*s.* *per* Yard, how many Yards did it contain? *Anſw.* 22 *Yds.*

37. If 1 *C.* Weight of Cheeſe coſt 37*s.* 4*d.* what is that *per lb.*? *Anſw.* 4*d.*

38. Coals at 33*s. per* Chaldron, how much *per* Buſhel? *Anſw.* 11*d.*

39. What coſt 49392 Caſe-Knives, at 4 *s.* 4 *d. per* Dozen? *Anſw.* 891 *l.* 16 *s.*

40. If a Gentleman has an Eſtate of 245 *l.* 10 *s.* a Year, how much may he ſpend one Day with another, to lay up 60 Guineas at the Year's End? *Anſw.* 10 *s. per Day.*

41. If 17 *C.* 3 *qrs.* 17 *lb.* of Tobacco, coſt 133 *l.* 13 *s.* 4 *d.* what coſt 1 *oz.*? *Anſw.* 1 *d.*

42. If 1 *C.* Weight of Lead coſt 15 *s.* 11 *d.* what coſt 5 Fother? *Anſw.* 77 *l.* 11 *s.* 10 *d.* $\frac{1}{2}$.

43. When the Tun of Wine coſt 42 *l.* what coſt 1 Quart? *Anſw.* 10 *d.*

44. At a Noble *per* Week, how many Months Board may I have for 50 *l.*? *Anſw.* 37 *Months,* 2 *Weeks.*

45. What coſt a Pack of Wool, weighing 2 *C.* 1 *qr.* 19 *lb.* at 8 *s.* 6 *d. per* Stone? *Anſw.* 8 *l.* 4 *s.* 6 *d.* 1 *qr.* $\frac{10}{14}$.

46. What is Cheeſe *per C.* Weight, at 3 *d.* $\frac{1}{2}$ *per lb.*? *Anſw.* 1 *l.* 12 *s.* 8 *d.*

47. If a Yard of Cambric coſt 12 *s.* what coſt 4 Pieces, each 20 Yards? *Anſw.* 48 *l.*

48. If a Yard of Broad Cloth coſt 18 *s.* what coſt 5 Pieces, each 20 Yards? *Anſw.* 90 *l.*

49. If Lead be ſold for 1 *d.* $\frac{1}{2}$ *per lb.* what is 3 *C.* Weight worth? *Anſw.* 2 *l.* 2 *s.*

50. If Coffee be ſold for 8 *d.* $\frac{1}{4}$ *per oz.* what is 6 *C.* Weight worth? *Anſw.* 369 *l.* 12 *s.*

2. *Of* INVERSE PROPORTION.

Q. *What is* Inverſe Proportion?

A. Inverſe Proportion is when *more* requires *leſs*, or *leſs* requires *more.*

Q. *What is meant by* more requires leſs?

A. More requires leſs, is when the third Term is *greater* than the firſt, and requires the fourth Term to be *leſs* than the ſecond?

Q. *What is meant by* leſs requires more?

A. Leſs requires more, is when the third Term is *leſs* than the firſt, and requires the fourth Term to be *greater* than the ſecond.

Q. *How is the fourth Term in* Inverſe Proportion *found?*

A. By multiplying the firſt and ſecond *Terms* together, and dividing that Product by the *third Term.*

Q. *What* Proportion *does the* fourth Term *bear to any of the reſt?*

A. It bears ſuch Proportion to the *Second,* as the *Firſt* does to the *Third.*

EXAM-

EXAMPLES.

1. If 48 Men can build a Wall in 24 Days, how many Men can do the ſame in 192 Days? *Anſw.* 6 *Men.*

2. If I lent my Friend 100*l.* for 6 Months (allowing the Month to be 30 Days) how long ought he to lend me 1000*l.* to requite my Kindneſs? *Anſw.* 18 *Days.*

3. If 100*l.* in 12 Months gain 6*l.* Intereſt, what Principal will gain the ſame in 8 Months? *Anſw.* 150*l.*

4. If a Footman performs a Journey in 3 Days, when the Days are 16 Hours long, how many Days will he require of 12 Hours long, to go the ſame Journey in? *Anſw.* 4 *Days.*

5. How many Yards of Matting, that is half Yard wide, will cover a Room that is 18 Feet wide, and 30 Feet long? *Anſw.* 120 *Yards.*

6. If 28*s.* will pay for the Carriage of an *C.* Weight 150 Miles, how far may 6 *C.* Weight be carried for the ſame Mony? *Anſw.* 25 *Miles.*

7. How much in length, that is 3 Inches broad, will make a Foot ſquare? *Anſw.* 48 *Inches.*

8. If 15 Shillings worth of Wine will ſerve 46 Men, when the Tun is worth 12*l.* how many Men will the ſame 15 Shillings-worth ſuffice, when the Tun is worth but 8*l.* *Anſw.* 69 *Men.*

9. If when the Price of a Buſhel of Wheat is 6*s.* 3*d.* the Penny-loaf will weigh 9*oz.* what muſt the Penny-loaf weigh, when Wheat is at 4*s.* 6*d.* the Buſhel? *Anſw.* 12 *oz.* 10 *dwts.*

10. Suppoſe 800 Soldiers were placed in a Garriſon, and their Proviſions were computed ſufficient for 2 Months, how many Soldiers muſt depart, that the Proviſions may ſerve them 5 Months? *Anſw.* 480 *Men.*

11. There is a Ciſtern, having a Cock, which will empty it in 12 Hours; I demand how many Cocks, of the ſame Capacity, there muſt be to empty it in a Quarter of an Hour? *Anſw.* 48 *Cocks.*

12. There was a certain Building raiſed in 8 Months by 120 Workmen, but the ſame being demoliſh'd, it is required to be rebuilt in 2 Months; I demand how many Men muſt be employed about it? *Anſw.* 480 *Men.*

13. A Piece of Tapeſtry is 3 Ells Flemiſh wide, and 4 Ells Flemiſh long, and it is required to be lined with ſomething that is but 3 Quarters of a Yard wide; I demand how many Yards there muſt be to compleat the Lining? *Anſw.* 9 *Yards.*

Of PRACTICE.

Q. W*HAT is* Practice?

A. It is a ſhort Way of finding the Value of any Quantity of Goods, by the given Price of one Integer.

Q. *How do you prove Queſtions in* Practice?

A. By the Single Rule of Three Direct: Or *Practice* may be proved by itſelf, by varying the Parts.

The TABLES.

s.		*d.*	*l.*		*s.*	*d.*	*l.*	*s.*	*d.*	*C.wt.*		*lb.*
$\frac{1}{2}$	is	6	$\frac{1}{2}$	is	10	0	$\frac{1}{15}$	1	4	$\frac{1}{2}$	is	56
$\frac{1}{3}$		4	$\frac{1}{3}$		6	8	$\frac{1}{16}$	1	3	$\frac{1}{4}$		28
$\frac{1}{4}$		3	$\frac{1}{4}$		5	0	$\frac{1}{20}$	1	0	$\frac{1}{7}$		16
$\frac{1}{6}$		2	$\frac{1}{5}$		4	0	$\frac{1}{30}$	0	8	$\frac{1}{8}$		14
$\frac{1}{8}$		$1\frac{1}{2}$	$\frac{1}{6}$		3	4	$\frac{1}{40}$	0	6	$\frac{1}{14}$		8
$\frac{1}{12}$		1	$\frac{1}{8}$		2	6	$\frac{1}{60}$	0	4	$\frac{1}{16}$		7
			$\frac{1}{10}$		2	0	$\frac{1}{80}$	0	3			
			$\frac{1}{12}$		1	8	$\frac{1}{120}$	0	2			

CASE I.

Q. *What muſt be done with the Price of an* Integer, *when it is leſs than a Penny?*

A. Find the aliquot Parts of that Price contained in a *Penny*, which muſt be *Diviſors* to the given Sum; that is, if the *Price* be a Farthing, ſay a Farthing is the fourth of a Penny, and ſet it thus, $\mid \frac{1}{4} \mid \frac{1}{4} \mid$. If the Price be a Halfpenny, then ſay, a Halfpenny is the Half, thus, $\mid \frac{1}{2} \mid \frac{1}{2} \mid$. If it is three Farthings, then ſay, a Halfpenny is the half of a Penny, and a Farthing is the fourth of a Penny, thus, $\left| \begin{array}{c} \frac{1}{2} \\ \frac{1}{4} \end{array} \right| \begin{array}{c} \frac{1}{2} \\ \frac{1}{4} \end{array} \right|$

Q. *What do you obſerve concerning theſe Columns?*

A. The firſt Column contains the *Mony*, and the other the *Parts*.

Note, *When there are more* aliquot Parts *than one, their* Quotients *muſt be added together, and the Sum, if the firſt* aliquot Part *be taken from a* Penny, *will be* Pence; *if it be taken from a* Shilling, *will be* Shillings; *or if it be taken from a* Pound *will be* Pounds.

2. *It is frequently better to take* Parts *of* Parts, *than* Parts *of the* whole Price; *and then the* three Farthings *above-mentioned may as well be taken thus,* $\left| \begin{array}{c} \frac{1}{2} \\ \frac{1}{4} \end{array} \right| \begin{array}{c} \frac{1}{2} \\ \frac{1}{2} \end{array} \right|$ *that is, a* Halfpenny *is the* half *of a* Penny *and a* Farthing *is the half of a* Halfpenny.

EXAMPLES.

$\frac{1}{4}$	$\frac{1}{4}$	7612 at $\frac{1}{4}$	1280 *at* $\frac{1}{4}$
	12	1903	*Facit* 1 *l.* 6 *s.* 8 *d.*
	2|0	151|8	
		7 *l.* 18 *s.* 7 *d.*	
$\frac{1}{2}$	$\frac{1}{2}$	6812 at $\frac{1}{2}$	7672 *at* $\frac{1}{2}$
	12	3406	*Facit* 15 *l.* 19 *s.* 8 *d.*
	2|0	28|3 10	
		14 *l.* 3 *s.* 10 *d.*	
$\frac{1}{2}$	$\frac{1}{2}$	4712 *at* $\frac{3}{4}$	9180 *at* $\frac{3}{4}$
$\frac{1}{4}$	$\frac{1}{2}$	2356	*Facit* 28 *l.* 13 *s.* 9 *d.*
		1178	
	12	3534	
	2|0	29|4 6.	
		14 *l.* 14 *s.* 6 *d.*	

CASE 2.

Q. *What muſt be done with the Price of an* Integer, *when it is leſs than a* Shilling?

A. Find the aliquot Parts of that Price contain'd in a *Shilling*, which muſt be Diviſors to the given Sum. Or thus,

If the given *Price* be not the aliquot Part of a *Shilling*, then firſt take ſome Part of it that is an aliquot Part; and for the remaining Part of the *Price*, let it be taken out of the foregoing Part or Parts, and then add the Quotients together as before, the Total will be the Anſwer in *Shillings*.

EXAMPLES.

1	$\frac{1}{12}$	7612 *at* 1 *d.*	6812 *at* 1 *d.*
	2|0	63|4	*Facit* 28 *l.* 7 *s.* 8 *d.*
		31 *l.* 14 *s.* 4 *a.*	
1	$\frac{1}{12}$	8612 *at* 1 *d.* $\frac{1}{4}$	1861 *at* 1 *d.* $\frac{1}{4}$
$\frac{1}{4}$	$\frac{1}{4}$	717 8	*Facit* 9 *l.* 13 *s.* 10 *d.* $\frac{1}{4}$
		179 5	
	2|0	89|7 1	4121 *at* 1 *d.* $\frac{1}{2}$
		44 *l.* 17 *s.* 1 *d.*	*Facit* 25 *l.* 15 *s.* 1 *d.* $\frac{1}{2}$

1861 *at* 1 *d.* $\frac{3}{4}$

Facit 13 *l.* 11 *s.* 4 *d.* $\frac{3}{4}$

4761 *at* 2 *d.*

Facit 39 *l.* 13 *s.* 6 *d.*

6181 *at* 2 *d.* $\frac{1}{4}$

Facit 57 *l.* 18 *s.* 11 *d.* $\frac{1}{4}$

1218 *at* 2 *d.* $\frac{1}{2}$

Facit 12 *l.* 13 *s.* 9 *d.*

8012 *at* 2 *d.* $\frac{3}{4}$

Facit 91 *l.* 16 *s.* 1 *d.*

7612 *at* 3 *d.*

Facit 95 *l.* 3 *s.*

6128 *at* 3 *d.* $\frac{1}{4}$

Facit 82 *l.* 19 *s.* 8 *d.*

6180 *at* 3 *d.* $\frac{1}{2}$

Facit 90 *l.* 2 *s.* 6 *d.*

7812 *at* 3 *d.* $\frac{3}{4}$

Facit 122 *l.* 1 *s.* 3 *d.*

8 20 *at* 4 *d.*

Facit 135 *l.* 6 *s.* 8 *d.*

70 0 *at* 4 *d.* $\frac{1}{4}$

Facit 123 *l.* 19 *s.* 2 *d.*

6001 *at* 4 *d.* $\frac{1}{2}$

Facit 112 *l.* 10 *s.* 4 *d.* $\frac{1}{2}$

7121 *at* 4 *d.* $\frac{3}{4}$

Facit 140 *l.* 18 *s.* 8 *d.* $\frac{3}{4}$

7181 *at* 5 *d.*

Facit 149 *l.* 12 *s.* 1 *d.*

8121 *at* 5 *d.* $\frac{1}{4}$

Facit 177 *l.* 12 *s.* 11 *d.* $\frac{1}{4}$

6128 *at* 5 *d.* $\frac{1}{2}$

Facit 140 *l.* 8 *s.* 8 *d.*

6100 *at* 5 *d.* $\frac{3}{4}$

Facit 146 *l.* 2 *s.* 11 *d.*

1000 *at* 6 *d.*

Facit 25 *l.*

7610 *at* 6 *d.* $\frac{1}{4}$

Facit 198 *l.* 3 *s.* 6 *d.* $\frac{1}{2}$

1218 *at* 6 *d.* $\frac{1}{2}$

Facit 32 *l.* 19 *s.* 9 *d.*

6000 *at* 6 *d.* $\frac{3}{4}$

Facit 168 *l.* 15 *s.*

7101 *at* 7 *d.*

Facit 207 *l.* 2 *s.* 3 *d.*

1001 *at* 7*d.* ¼

Facit 30*l.* 4*s.* 9*d.* ¼

4100 *at* 7*d.* ½

Facit 128*l.* 2*s.* 6*d.*

6120 *at* 7*d.* ¾

Facit 197*l.* 12*s.* 6*d.*

7100 *at* 8*d.*

Facit 236*l.* 13*s.* 4*d.*

6100 *at* 8*d.* ¼

Facit 209*l.* 13*s.* 9*d.*

8000 *at* 8*d.* ½

Facit 283*l.* 6*s.* 8*d.*

6000 *at* 8*d.* ¾

Facit 218*l.* 15*s.*

9000 *at* 9*d.*

Facit 337*l.* 10*s.*

4121 *at* 9*d.* ¼

Facit 158*l.* 16*s.* 7*d.* ¼

6100 *at* 9*d.* ½

Facit 241*l.* 9*s.* 2*d.*

5918 *at* 9*d.* ¾

Facit 240*l.* 8*s.* 4*d.* ½

8121 *at* 10*d.**

Facit 338*l.* 7*s.* 6*d.*

6712 *at* 10*d.* ¼

Facit 286*l.* 13*s.* 2*d.*

1002 *at* 10*d.* ½

Facit 43*l.* 16*s.* 9*d.*

4680 *at* 10*d.* ¾

Facit 209*l.* 12*s.* 6*d.*

1260 *at* 11*d.*

Facit 57*l.* 15*s.*

6121 *at* 11*d.* ¼

Facit 286*l.* 18*s.* 5*d.*

1234 *at* 11*d.* ½

Facit 59*l.* 2*s.* 7*d.*

2345 *at* 11*d.* ¾

Facit 114*l.* 16*s.* 1*d.*

100 *at* 11*d.* ¾

Facit 4*l.* 17*s.* 11*d.*

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* Note, *When the Price of an* Integer *is* 10*d. annex a Cypher to* *given Number, and divide by* 12 *and by* 20.

CASE 3.

Q. *What muſt be done with the Price of an* Integer, *when it is greater than a* Shilling, *but leſs than two* Shillings?

A. Let the *Part* or *Parts* be taken only with ſo much of the given *Price* as is more than one *Shilling*; that is, if the *Price* be 14 *d.* ½, take the Parts only with 2 *d.* ½, and let the given Quantity ſtand for *Shillings*, which muſt be added with the reſt; and the Total will be the Anſwer in *Shillings*.

EXAMPLES.

¼ | ¼ | 486 *at* 12 *d.* ¼

12 | 121 ½

10 1 ½

2|0 | 49|6 1 ½

24 *l.* 16 *s.* 1 *d.* ½

½ | ½ | 486 *at* 12 *d.* ½

12 | 243

20 3

2|0 | 50|6 3

25 *l.* 6 *s.* 3 *d.*

7612 *at* 12 *d.* ¼

Facit 388 *l.* 10 *s.* 7 *d.*

1216 *at* 12 *d.* ½

Facit 63 *l.* 6 *s.* 8 *d.*

1216 *at* 12 *d.* ¾

Facit 64 *l.* 12 *s.*

6121 *at* 13 *d.*

Facit 331 *l.* 11 *s.* 1 *d.*

1281 *at* 13 *d.* ¼

Facit 70 *l.* 14 *s.* 5 *d.* ¼

6100 *at* 13 *d.* ½

Facit 343 *l.* 2 *s.* 6 *d.*

1210 *at* 13 *d.* ¾

Facit 69 *l.* 6 *s.* 5 *d.* ½

1210 *at* 14 *d.*

Facit 70 *l.* 11 *s.* 8 *d.*

1271 *at* 14 *d.* ¼

Facit 75 *l.* 9 *s.* 3 *d.* ¾

6120 *at* 14 *d.* ½

Facit 369 *l.* 15 *s.*

1210 *at* 14 *d.* ¾

Facit 74 *l.* 7 *s.* 3 *d.* ½

1260 *at* 15 *d.*

Facit 78 *l.* 15 *s.*

1612 *at* 15 *d.* ¼

Facit 102 *l.* 8 *s.* 7 *d.*

1210 *at* 15 *d.* ½

Facit 78 *l.* 2 *s.* 11 *d.*

7612 *at* 15 *d.* ¾

Facit 499 *l.* 10 *s.* 9 *d.*

6100 *at* 16 *d.*

Facit 406 *l.* 13 *s.* 4 *d.*

7121 *at* 16 *d.* ¼

Facit 482 *l.* 3 *s.* 0 *d.* ¼

1218 *at* 16 *d.* ½

Facit 83 *l.* 14 *s.* 9 *d.*

8100 *at* 16 *d.* ¾

Facit 565 *l.* 6 *s.* 3 *d.*

4128 *at* 17 *d.*

Facit 292 *l.* 8 *s.*

1230 *at* 17 *d.* ¼

Facit 88 *l.* 8 *s.* 1 *d.* ½

2340 *at* 17 *d.* ½

Facit 170 *l.* 12 *s.* 6 *d.*

3450 *at* 17 *d.* ¾

Facit 255 *l.* 3 *s.* 1 *d.* ½

4560 *at* 18 *d.*

Facit 342 *l.*

5670 *at* 18 *d.* ¼

Facit 431 *l.* 3 *s.* 1 *d.*

6789 *at* 18 *d.* ½

Facit 523 *l.* 6 *s.* 4 *d.*

7890 *at* 18 *d.* ¾

Facit 616 *l.* 8 *s.* 1 *d.*

8900 *at* 19 *d.*

Facit 704 *l.* 11 *s.* 8 *d.*

9000 *at* 19 *d.* ¼

Facit 721 *l.* 17 *s.* 6

9876 *at* 19 *d.* ½

Facit 802 *l.* 8 *s.* 6 *d.*

8765 *at* 19 *d.* ¾

Facit 721 *l.* 5 *s.* 8 *d.*

7120 *at* 20 *d.* ¼

Facit 600 *l.* 15 *s.*

6543 *at* 20 *d.* ½

Facit 558 *l.* 17 *s.* 7 *d.*

5432 *at* 20 *d.* ¾

Facit 469 *l.* 12 *s.* 10

432

4321 *at* 21 *d.*

Facit 378 *l.* 1 *s.* 9 *d.*

3210 *at* 21 *d.* ¼

Facit 284 *l.* 4 *s.* 4 *d.* ½

2100 *at* 21 *d.* ½

Facit 188 *l.* 2 *s.* 6 *d.*

1000 *at* 21 *d.* ¾

Facit 90 *l.* 12 *s.* 6 *d.*

1090 *at* 22 *d.**

Facit 99 *l.* 18 *s.* 4 *d.*

9010 *at* 22 *d.* ¼

Facit 835 *l.* 6 *s.* 0 *d.* ½

6700 *at* 22 *d.* ½

Facit 628 *l.* 2 *s.* 6 *d.*

6812 *at* 22 *d.* ¾

Facit 645 *l.* 14 *s.* 3 *d.*

1210 *at* 23 *d.*

Facit 115 *l.* 19 *s.* 2 *d.*

1800 *at* 23 *d.* ¼

Facit 174 *l.* 7 *s.* 6 *d.*

6760 *at* 23 *d.* ½

Facit 661 *l.* 18 *s.* 4 *d.*

9990 *at* 23 *d.* ¾

Facit 988 *l.* 11 *s.* 10 *d.* ½

* Note, *When the Price of an* Integer *is* 22 *d. annex a* Cypher *to the given Number, and divide by* 12 *(as at* 10 *d.) then add both Lines together; the Sum will be the* Total *in* Shillings.

CASE 4.

Q. *What muſt be done with the* Price *of an* Integer, *when it is any even Number of* Shillings *under* 20 *s. as* 6 *s* 8 *s.* &c.?

A. Multiply the given *Quantity* by half of the *Price*, and double the firſt Figure of the Product for *Shillings*, and the reſt of the *Product* will be *Pounds*.

Note, *This* Rule *is taken from an Operation in* Decimals.

EXAMPLES.

486 *at* 2 *s.*
1
48 *l.* 12 *s.*

769 *at* 4 *s.*
2
153 *l.* 16 *s.*

7612 *at* 2 *s.*

Facit 761 *l.* 4 *s.*

1286 *at* 4 *s.*

Facit 257 *l.* 4 *s.*

7618 *at* 6*s.*	171 *at* 14*s.*
Facit 2285*l.* 8*s.*	*Facit* 119*l.* 14*s.*
191 *at* 8*s.*	171 *at* 16*s.*
Facit 76*l.* 8*s.*	*Facit* 136*l.* 16*s.*
180 *at* 10*s.**	712 *at* 18*s.*
Facit 90*l.*	*Facit* 640*l.* 16*s.*

* Note, *When the Price of an* Integer *is* 10 *s. you may take half of the given* Integers, *and it is done; and the* Remainder *(if there be any) will be* 10 *s.*

CASE 5.

Q. *What muſt be done with the Price of an* Integer, *when it is any odd Number of* Shillings *under* 20, *as* 3*s.* 5*s.* &c.?

A. Multiply the given *Integers* by the *Price,* and that Product divide by 20, the Quotient will be the *Anſwer.*

EXAMPLES.

121 *at* 1*s.*	121 *at* 11*s.*
Facit 6*l.* 1*s.*	*Facit* 66*l.* 11*s.*
121 *at* 3*s.*	600 *at* 13*s.*
Facit 18*l.* 3*s.*	*Facit* 390*l.*
471 *at* 5*s.**	190 *at* 15*s.*
Facit 117*l.* 15*s.*	*Facit* 142*l.* 10*s.*
860 *at* 7*s.*	121 *at* 17*s.*
Facit 301*l.*	*Facit* 102*l.* 17*s.*
612 *at* 9*s.*	100 *at* 19*s.*
Facit 275*l.* 8*s.*	*Facit* 95*l.*

* Note, *When the Price of an* Integer *is* 5 *s. the Work may be done at once, becauſe* 5 *s. is the* fourth Part *of a Pound.*

CASE 6.

Q. *What muſt be done with the* Price *of an* Integer, *when it is* Shillings *and* Pence ?

A. 1. If the *Shillings* and *Pence* be the *aliquot* Part of a *Pound*, it may be done at once, as 6 *s.* 8 *d.* is the third of a *Pound.*

EXAMPLES.

12 *at* 6 *s.* 8 *d.*

Facit 4 *l.*

69 *at* 3 *s.* 4 *d.*

Facit 11 *l.* 10 *s.*

21 *at* 2 *s.* 6 *d.*

Facit 2 *l.* 12 *s.* 6 *d.*

96 *at* 1 *s.* 8 *d.*

Facit 8 *l.*

2. If the *Shillings* and *Pence* be not the *aliquot* Part of a *Pound*, or if there be *Shillings*, *Pence* and *Farthings*, multiply the given Quantity by the *Shillings*, and take Parts with the reſt, and add them together ; the Sum will be the Anſwer in *Shillings*.

EXAMPLES.

3	$\frac{1}{4}$	126 *at* 9 *s.* 3 *d.*
		9
		1134
		31 6
	2|0	116|5 6
		58 *l.* 5 *s.* 6 *d.*

86 *at* 6 *s.* 10 *d.*

Facit 29 *l.* 7 *s.* 8 *d.*

10 *at* 12 *s.* 4 *d.*

Facit 6 *l.* 3 *s.* 4 *d.*

30 *at* 4 *s.* 9 *d.*

Facit 7 *l.* 2 *s.* 6 *d.*

73 *at* 7 *s.* 6 *d.*

Facit 27 *l.* 7 *s.* 6 *d.*

70 *at* 7 *s.* 4 *d.* $\frac{3}{4}$

Facit 25 *l.* 17 *s.* 8 *d.* $\frac{1}{2}$

55 *at* 4 *s.* 8 *d.* $\frac{1}{2}$

Facit 12 *l.* 18 *s.* 11 *d.* $\frac{1}{2}$

77 *at* 10 *s.* 6 *d.* $\frac{1}{4}$

Facit 40 *l.* 10 *s.* 1 *d.* $\frac{1}{4}$

12 *at* 13 *s.* 10 *d.* $\frac{1}{2}$

Facit 8 *l.* 6 *s.* 6 *d.*

17 *at* 17 *s.* 4 *d.* $\frac{1}{4}$

Facit 14 *l.* 15 *s.* 0 *d.* $\frac{1}{4}$

46 *at* 7 *s.* 3 *d.* $\frac{3}{4}$

Facit 16 *l.* 16 *s.* 4 *d.* $\frac{1}{2}$

CASE 7.

Q. *What muſt be done with the* Price *of an* Integer, *when* is Pounds *only ?*

A. Multiply the given *Integers* by the *Price*, the Produ will be the *Anſwer.*

EXAMPLES.

72 *at* 5*l.*	19 *at* 4*l.*
Facit 360*l.*	*Facit* 76*l.*
64 *at* 3*l.*	46 *at* 7*l.*
Facit 192*l.*	*Facit* 322*l.*

CASE 8.

Q. *What muſt be done with the* Price *of an* Integer, *when* is Pounds *and* Shillings ?

A. Multiply the *Integers* given, by the *Pounds* ; then proceed with the *Shillings*, if they are *even*, according to *Caſe* 4 but if they are *odd*, according to *Caſe* 5, and add them together ; the Total will be the *Anſwer.*

EXAMPLES.

26 *at* 4*l.* 8*s.*	48 *at* 7*l.* 10*s.*
4	
	Facit 360*l.*
104	
10 8	26 *at* 11*l.* 14*s.*
114*l.* 8*s.*	
	Facit 304*l.* 4*s.*
49 *at* 3*l.* 7*s.*	15 *at* 4*l.* 13*s.*
7	
2|0 3 413	*Facit* 69*l.* 15*s.*
1 7 3	17 *at* 9*l.* 15*s.*
1 4 7	
1 0 4*l.* 3*s.*	*Facit* 165*l.* 15*s.*
36 *at* 5*l.* 13*s.*	16 *at* 3*l.* 6*s.*
Facit 203*l.* 8*s.*	*Facit* 52*l.* 16*s.*

CASE 9.

Q. *What muſt be done with the* Price *of an* Integer, *when it is* Pounds, Shillings, *and* Pence?

A. 1. If the *Shillings* and *Pence* be the aliquot Part of a *Pound*, multiply the given *Integers* by the *Pounds*, and divide by the *aliquot Part*: Thoſe Numbers ſo found out, being added together, will be the Sum required.

EXAMPLES.

47 *at* 3*l.* 3*s.* 4*d.*	17 *at* 2*l.* 6*s.* 8*d.*
Facit 148*l.* 16*s.* 8*d.*	*Facit* 39*l.* 13*s.* 4*d.*
20 *at* 4*l.* 13*s.* 4*d.*	30 *at* 1*l.* 2*s.* 6*d.*
Facit 93*l.* 6*s.* 8*d.*	*Facit* 33*l.* 15*s.*

2. If the *Shillings* and *Pence* be not the aliquot Part of a *Pound*, or if there be *Shillings*, *Pence* and *Farthings* given with the *Pounds*, then reduce the *Pounds* and *Shillings* into *Shillings*, and multiply the given *Integers* by the ſaid *Shillings*; next take Parts with the reſt of the *Price*, and add them together as before.

EXAMPLES.

```
3 | 1/4 |    120 at 4l.7s.3d.1/2
    |     |     87     20
    |     | ------    ---
    |     |  10440     87
1/2 | 1/8 |     30
    |     |      5
    |     | ------
    | 2|0 | 104715
    |     | ----------
    |     |   523l. 15s.
```

14 *at* 2*l.* 10*s.* 6*d.*	21 *at* 5*l.* 14*s.* 7*d.* ¼
Facit 35*l.* 7*s.*	*Facit* 120*l.* 6*s.* 8*d.* ¼
	70 *at* 1*l.* 14*s.* 7*d.*
	Facit 121*l.* 0*s.* 10*d.*
	46 *at* 3*l.* 19*s.* 8*d.* ½
	Facit 183*l.* 6*s.* 7*d.*

Q. *What other Ways have you of anſwering* Queſtions *in this* Caſe?

A. 1. When the Number of *Integers* does not exceed 12, multiply the *Price* by the *Integers*, as in *Compound Multiplication*, the *Product* will be the *Anſwer*.

2. When the Number of *Integers* does exceed 12, multiply the *Price* by the *Parts* inſtead of the *Whole*. Or,

3. You may multiply the *Price* by the whole Number of *Integers*. Thus,

58361 *Hhds. of Tobacco, at* 48*l.* 12*s.* 9*d. per Hhd.*

l.	s.	d.
48	12	9
		58361
48	12	9
2918	5	0
14591	5	0
389100	0	0
2431875	0	0
2838533	2	9

Memorandum.

1.		2.		3.		4.	
s.	d.	s.	d.	s.	d.	s.	d.
16	6						
18	3	2	6				
2	0						
3	9	17	6	15	0	10	0

Q. *How is it wrought?*

A. Multiply by the ſeveral Figures in the *Multiplier*, as in *Compound Multiplication*, but with this Difference, that the *Products* of the *Shillings* and *Pence*, multiplied by the 6, 3, 8, and 5, muſt be placed by themſelves in a *Memorandum*, and the *Products* of the *Pounds* by the ſame Figures, placed as in *Simple Multiplication*. Thus,

	l.	s.	d.		
	48	12	9		
			58361	*Memor.*	
1 *Product* - - -	48	12	9	s.	d.
2 - - - - - -	291			16	6
3 - - - - - -	145			18	3
4 - - - -	389			2	0
5 - - - - -	243			3	9

Then to fill up the *Blanks* in the *ſecond Product*, take half of the 16*s.* in the *Memorandum*, which is 8, and ſet it in the *Units* Place of the *Pounds*. Annex a *Cypher* to the 6*d.* which makes 60*d.* or 5*s.* place this under the *Shillings*, and the Line is done with, there being no Pence remaining.

For the *Blanks* in the *third Product*, take half of the 18*s.* in the *Memorandum*, and put it in the *Tens* Place of the *Pounds*. Annex a *Cypher* to the 3*d.* which makes 30*d.* or 2*s.* 6*d.* this put in the *ſecond Memorandum*. Then take half of the 2*s.* in this new *Memorandum*, and put it in the *Units* Place of the *Pounds*. Annex a *Cypher* to the 6*d.* in the new *Memorandum*, which makes 60*d.* or 5*s.* put this in the Place of *Shillings*, and this Line is finiſhed, there being no *Pence* remaining.

For the *Blanks* in the *fourth Product*, take half of the 2*s.* in the firſt *Memorandum*, and put it in the *Hundreds* Place of the *Pounds*; and becauſe there remains nothing, nor is there any *Pence* in the *Memorandum*, therefore fill up the other *Blanks* with *Cyphers*, and the Line is finiſhed.

For the *Blanks* in the *fifth Product*, take half of the 3*s.* in the *firſt Memorandum*, and put it in the *Thouſands* Place of the *Pounds*; then, becauſe there is one remaining; put that in the *ſecond Memorandum*. Annex a *Cypher* to the 9*d.* which makes 90*d.* or 7*s.* 6*d.* put this to the former 1, and it makes 17*s.* 6*d.* take half of the 17*s.* and put it in the *Hundreds* Place of the *Pounds*; then, becauſe there is 1 remaining, put that in the *third Memorandum*. Annex a *Cypher* to the 6*d.* and it makes 60*d.* or 5*s.* put this to the 1 in the *third Memorandum*, and it makes 15*s.* take half of the 15*s.* and put it in the *Tens* Place of the *Pounds*; then, becauſe there remains 1, put it in the *fourth Memorandum*, and ſince there are no *Pence* in the *third Memorandum* to put a *Cypher* to, let a *Cypher* be annexed to the 1 in the *laſt Memorandum*, which makes 10*s*, take half of this 10*s.* and put it in the *Units* Place of the *Pounds*; then becauſe there are no *Pence* in the *Memorandum*, neither is there any thing remaining of the 10, therefore fill up the other *Blanks* with *Cyphers*, and the Line is compleated: Add all together, and their *Sum* is the Total *Product* of the Whole.

	l.	*s.*	*d.*	*Memorandum.*		
7000 *Hhds. of Wine, at*	17	14	8 *per Hbd.*	1.	2.	3.
			7000	*s. d.*	*s. d.*	*s. d.*
	124133	6	8	2 8	6 8	6 8

Note 1, *To fill up the* Blanks *in the* Pounds *of the* Second, Third, *&c.* Products, *always take half of the* Shillings *in the* Memorandum; *and if* 1 *remains, make a* new Memorandum *of it.*

3. *Always annex a* Cypher *to the* Pence, *and whatever Number of* Shillings *they make, put them to the* 1 *in the* new Memorandum; *and ſo on till all the* Blanks *in the* Pounds *are filled up;* *If there be any* Pence *yet remaining in the* Memorandum, *put a* Cypher *to them, and what* Shillings *and* Pence *they make, let them be put in the* Shillings *and* Pence *Place in the* Product.

3. *All the* Examples *in this* Caſe, *and* Caſe 8, *may ſerve here inſtead of others.*

CASE 10.

Q. *What muſt be done with the* Price *of an* Integer, *when both* that *and the* Quantity *given are of ſeveral Denominations?*

A. Multiply the *Price* by the *Integers*, and take Parts with the Parts of the *Integer*.

EXAM-

EXAMPLES.

C.	qrs.	lb.		l:	s.				l.	s.	d.
12	3	16	*of Tobacco, at*	4	12		*per* C. *wt.*	*Facit*	59	6	1½+
	½	½			12						
				55	4						
	¼	½		2	6						
	16	1/7		1	3						
				0	13	1½+					
				59	6	1½+					

C.	qrs.	lb.		l.	s.	d.			l.	s.	d.
12	2	14	*of Tobacco, at*	3	14	0	*per* C.	*Facit*	46	14	3
17	3	19	*of Sugar, at*	2	2	6	*per* C.	*Facit*	38	1	6¾
4	1	16	*of Soap, at*	3	12	0	*per* C.	*Facit*	15	16	3½
10	0	12	*of Tallow, at*	1	19	6	*per* C.	*Facit*	19	19	2½
5	1	0	*of Tobacco, at*	2	17	0	*per* C.	*Facit*	14	19	3
4	3	0	*of Sugar, at*	2	18	6	*per* C.	*Facit*	13	17	10½
7	0	19	*of Sugar, at*	3	16	0	*per* C.	*Facit*	27	4	10½
5	2	10	*of Tobacco, at*	2	18	6½	*per* C.	*Facit*	16	7	2¼
7	1	14	*of Tobacco, at*	3	15	9¼	*per* C.	*Facit*	27	18	9½
9	2	26	*of Tallow, at*	4	10	4½	*per* C.	*Facit*	43	19	6

Of INTEREST.

Q. HOW *many kinds of* Intereſt *are there?*

A. Two: *Simple* and *Compound.*

Of Simple INTEREST.

Q. *What is* Simple Intereſt?

A. Simple Intereſt is the *Profit* allowed in the lending or forbearance of any Sum of Mony, for ſome determined Space of Time.

Q. *What is the* Principal?

A. The *Principal* is any Sum of Mony lent, for which *Intereſt* is to be received.

Q. *What is the* Rate per Cent.?

A. It is a certain *Sum* agreed on between the *Lender* and the *Borrower*, to be paid for every 100 *Pounds*, for the Uſe of the *Principal*, which, according to the Laws of *England*, ought not to be above 5 *l.* for the Uſe of 100 *l.* for 1 Year, and 10 *l.* for the Uſe of 100 *l.* for two Years; and ſo on for any Sum of *Mony*, in Proportion to the *Time* propoſed.

Q. *What is the* Amount?

A. It is the *Principal* and *Intereſt* added together.

Q. *What other Things is* Intereſt *applicable to?*

A. It is applied to *Commiſſion* or *Proviſion*, *Brokage*, *Storage*, and *Inſurance*, which have no reſpect to *Time*.

CASE I.

Q. *How do you find the* Intereſt *of any given Sum for a* Year?

A Multiply the *Principal* by the *Rate per Cent.* and divide that Product by 100, the Quotient is the *Intereſt* required.

Q. *How do you find the* Intereſt *of any given* Sum *for ſeveral* Years?

A. Multiply the *Intereſt* for one *Year* by the Number of *Years* given in the Queſtion, the Product will be the *Anſwer*.

EXAMPLES.

1. If 100*l.* in one Year's Time yield 5*l.* Intereſt, what will 486*l.* yield in the ſame Time? *Anſw.* 24*l.* 6*s.*

```
      l.
     486
       5
   ------
   24|30
     |20
     |--
    6|00
```

2. What is the Intereſt of 220*l.* for a Year, at 4 per Cent. per Ann.? *Anſw.* 8*l.* 16*s.*

3. What is the Intereſt of 76*l.* for two Years, at 5 per Cent. per Ann.? *Anſw.* 7*l.* 12*s.*

4. What is the Amount of 400*l.* for 12 Years, at 6 per Cent. per Ann.? *Anſw.* 688*l.*

Of Factors *Allowances, commonly called* Commiſſion *or* Proviſion.

Q. *What is* Commiſſion *or* Proviſion?

A It is an Allowance from *Merchants* to their *Factors* or *Agents* beyond the Sea, in the buying or ſelling of any ſort of Goods; and is a certain *Rate per Cent.* according to the Cuſtom of the Country where the *Factor* reſides.

EXAMPLES.

5. My Factor ſends me Word, that he has bought Goods to the Value of 500*l.* 13*s.* 6*d.* upon my Account; I demand what his Commiſſion comes to, at 3½ per Cent.? *Anſw.* 17*l.* 10*s.* 5*d.* 2*qrs.* $\frac{68}{100}$.

6. My Correſpondent has diſburſed upon my Account, the Sum of 1009*l.* 18*s.* what muſt he demand for his Commiſſion, when I allow him 2$\frac{1}{4}$ *per Cent.*? *Anſw.* 22*l.* 14*s.* 5*d.* 1*qr.* $\frac{84}{100}$.

7. Suppoſe I allow my Correſpondent 1$\frac{3}{4}$ *per Cent.* for Proviſion; what may he demand on the Diſburſement of 704*l.* 15*s.* 4*d.*? *Anſw.* 12*l.* 6*s.* 8*d.* $\frac{2}{100}$.

CASE 2.

Q. *How do you find the* Intereſt *of any* Sum *for* $\frac{1}{4}$, $\frac{1}{2}$, *or* $\frac{3}{4}$ *of a* Year, *beſides the Number of* Years *given in the* Queſtion?

A. For $\frac{1}{4}$ of a Year, take a *fourth* Part of the *Intereſt* for one Year; for $\frac{1}{2}$ a Year, take *half* of the *Intereſt* for one Year; for $\frac{3}{4}$ of a Year, take the Parts compounded of $\frac{3}{4}$ and add them to the *Intereſt* for the reſt of the Time; the *Sum* will be the *Intereſt* required.

EXAMPLES.

1. What is the Intereſt of 200*l.* for 3 Years and $\frac{3}{4}$, at 5 *per Cent. per Annum*? *Anſw.* 37*l.* 10*s.*

```
   200            | 1/2 | 1/2 | 10
     5            |     |     |  3
  ----            |     |     | --
 1 0|0 0          |     |     | 30
                  | 1/4 | 1/2 |  5
                  |     |     |  2 10
                                -----
                                37 10
```

2. What is the Intereſt of 468*l.* 12*s.* 4*d.* for 1 Year and $\frac{3}{4}$, at 6 *per Cent. per Annum*? *Anſw.* 49*l.* 4*s.* 1*d.*

3. What is the Intereſt of 112*l.* 10*s.* 4*d.* for 5 Years and $\frac{1}{2}$, at 6 *per Cent. per Annum*? *Anſw.* 37*l.* 2*s.* 6*d* +

4. What is the Intereſt of 468*l.* for 4 Years and $\frac{1}{4}$, at 6 *per Cent. per Annum*? *Anſw.* 119*l.* 6*s.* 8*d.* $\frac{3}{4}$.

5. What is the Intereſt of 1000*l.* for 2 Years $\frac{3}{4}$, at 4 *per Cent. per Annum*? *Anſw.* 110*l.*

Of BROKAGE.

Q. *What is* Brokage?

A. It is an Allowance made to Perſons called *Brokers*, at a certain *Rate per Cent.* for finding Cuſtomers, and ſelling to them the Goods of other Men, whether Strangers or Natives.

Q. *How do you find the* Brokage *of any* Sum?

A. Divide the given Sum by 100, and take Parts from the Quotient with the *Rate per Cent.*

EXAM-

EXAMPLES.

6. What is the Brokage of 700 *l.* 14 *s.* 6 *d.* at 4 *s. per Cent.*? *Anſw.* 1 *l.* 8 *s.* 0 *d.* ¼.

```
     l.  s.  d.                  l.  s.  d.
  7|00  14   6   | 4 | 1/5 | 7   0   1½
   |20                       -----------
   | —                        1   8   0¼+
  0|14
   |12
   | —
  1|74
   | 4
   | —
  2|96
```

7. What may a Broker demand for Brokage, when he ſells Goods to the Value of 500 *l.* 10 *s.* 7 *d.* and I allow him 7 *s. per Cent.*? *Anſw.* 1 *l.* 15 *s.* 0 *d.* ¼.

8. Suppoſe I employ a Broker, who ſells Goods to the Value of 909 *l.* 14 *s.* 10 *d.* what is the Brokage at 6 *s.* 6 *d. per Cent.*? *Anſw.* 2 *l.* 19 *s.* 1 *d.* ¼.

Note, *If the* Brokage *ſhould be* 1 *l. or more* per Cent. *the Operation will be the ſame with that in* Factors Allowances.

CASE 3.

Q. *How is the* Intereſt *of any* Sum *found, when the* Rate per Cent. *is* ¼, ½, *or* ¾, *more than the* Pounds *given in the ſaid* Rate?

A. Multiply the *Principal* by the *Pounds*, in the *Rate per Cent.* as before; and let the *Parts* for ¼, ½, *or* ¾, be taken from the *Principal*, and added to that *Product*; then proceed according to *Caſe* 1 or 2.

EXAMPLES.

1. What is the Intereſt of 400 *l.* for 2 Years, at 5½ *per Cent. per Annum*? *Anſw.* 44 *l.*

2. What is the Intereſt of 120 *l.* for a Year, at 4½ *per Cent. per Annum*? *Anſw.* 5 *l.* 8 *s.*

3. What is the Amount of 690 *l.* for 3 Years, at 4¼ *per Cent. per Annum*? *Anſw.* 777 *l.* 19 *s.* 6 *d.*

4. What is the Amount of 120 *l.* 10 *s.* for 2 Years and an Half, at 4¾ *per Cent. per Annum*? *Anſw.* 134 *l.* 16 *s.* 1 *d.* ¾.

5. What is the Intereſt of 300 *l.* for 5 Years and 3 Quarters, at 3¾ *per Cent. per Annum*? *Anſw.* 64 *l.* 13 *s.* 9 *d.*

CASE 4.

Q. *How do you find the* Intereſt *of any* Sum, *for a certain Number of* Weeks?

A. As 52 Weeks
Are to the Intereſt of the given Sum for a Year:
So are the Weeks given,
To the Intereſt required.

EXAMPLES.

1. What is the Intereſt of 400 *l.* for a Week, at 5 *per Cent. per Annum? Anſw.* 7 *s.* 8 *d.* 1 *qr.* $\frac{12}{52}$.

2 What is the Intereſt of 126 *l.* 12 *s.* for 16 Weeks, at $4\frac{1}{2}$ *per Cent. per Annum? Anſw.* 1 *l.* 15 *s.* 0 *d.* 2 *qrs.* $\frac{40}{52}$.

3. What is the Amount of 500 *l.* for 20 Weeks, at $3\frac{1}{2}$ *per Cent. per Annum? Anſw.* 506 *l.* 14 *s.* 7 *d.* 1 *qr.* $\frac{28}{52}$.

CASE 5.

Q. *How is the* Principal *found when the* Amount, Time, *and* Rate per Cent. *are given?*

A. As the Amount of 100 *l.* at the *Rate* and *Time* given
Is to 100 *l.*:
So is the *Amount* given
To the *Principal* required.

EXAMPLES.

1. What Principal being put to Intereſt for 9 Years, at *per Cent. per Annum,* will amount to 725 *l.*? *Anſw.* 500 *l.*

2. What Principal being put to Intereſt for 7 Years, will amount to 793 *l.* 12 *s.* at 4 *per Cent. per Annum? Anſw.* 620 *l.*

3. What Sum being put to Intereſt, will amount to 520 *l.* 16 *s.* in 8 Years, at 3 *per Cent. per Annum? Anſw.* 420 *l.*

CASE 6.

Q. *How is the* Rate per Cent. *found, when the* Amount, Time *and* Principal *are given?*

A. 1. As the *Principal*
Is to *Intereſt* for the whole *Time*:
So is 100 *l.*
To its *Intereſt* for the ſame *Time*.

2. Divide the *Intereſt* laſt found, by the *Time*, and the Quotient will be the *Rate per Cent.*

EXAMPLES.

1. At what Rate of Intereſt *per Cent.* will 500 *l.* amount to 725 *l.* in 9 Years Time? *Anſw.* 5 *per Cent.*

2. At what Rate of Intereſt *per Cent.* will 620 *l.* amount to 793 *l.* 12 *s.* in 7 Years? *Anſw.* 4 *per Cent.*

3. At what Rate of Intereſt *per Cent.* will 420 *l.* amount to 520 *l.* 16 *s.* in 8 Years? *Anſw.* 3 *per Cent.*

CASE 7.

Q. *How is the* Time *found, when the* Principal, Amount, *and* Rate per Cent. *are given?*

A. As the Intereſt of the Principal for 1 Year at the given Rate
Is to one Year:
So is the whole Intereſt
To the Time required.

EXAMPLES.

1. In what Time will 500 *l.* amount to 725 *l.* at 5 *per Cent. per Annum? Anſw.* 9 *Years.*

2. In what Time will 620 *l.* amount to 793 *l.* 12 *s.* at 4 *per Cent. per Annum? Anſw.* 7 *Years.*

3. In what Time will 420 *l.* amount to 520 *l.* 16 *s.* at 3 *per Cent. per Annum? Anſw.* 8 *Years.*

Q. *How are the* Queſtions *in the foregoing* Caſes *proved?*

A. Caſes 1, 5, 6 and 7 do exactly prove each other, by varying the *Queſtions*; yet all of them except *Caſe* 5; and the 1ſt, 2d, 5th, 6th, and 7th *Queſtions* in *Caſe* 1; and the 6th, 7th, and 8th, in *Caſe* 2, may as truly be anſwered by the *Double Rule of Three*, of which more hereafter.

Note 1, *The 1ſt, 2d, 5th, 6th, and 7th* Queſtions, *in* Caſe 1; *and the 6th, 7th, and 8th, in* Caſe 2, *are to be proved by the* Single Rule *of Three.*

2. Caſe 5, *cannot be anſwered by the* Double Rule *of* Three, *becauſe the* Principal *is not known in the* Queſtion, *and therefore there can be no Deduction of it from the* Amount, *to know the* Intereſt, *which muſt firſt be done.*

Of Simple Intereſt *for* Days.

Q. *How do you find the* Intereſt *for any Number of* Days?

A. Multiply the *Pence* of the *Principal* by the *Days*, and by the *Rate* of *Intereſt* for a *Dividend*, and 365 by 100 for a *Diviſor*, the *Quotient* will be the *Anſwer* in *Pence*.

Q. *How are the following* Queſtions *proved?*

A. As 365 Days
Are to the Intereſt of the given Sum for a Year:
So is the Time propoſed
To the Intereſt required.

EXAMPLES.

1. What is the Intereſt of 120 *l.* for 126 Days, at 4 *per Cent. per Annum? Anſw.* 1 *l.* 13 *s.* 1 *d.* 2 *qrs.* $\frac{258}{365}$.

2. What is the Intereſt of 126 *l.* for 145 Days, at 6 *per Cent. per Annum? Anſw.* 3 *l.* 0 *s.* 0 *d.* 3 *qrs.* $\frac{57}{365}$.

3. What is the Intereſt of 100 *l.* from *June* 1, 1759, to *March* 9, 1760, which was Leap-Year, at 5 *per Cent. per Annum?* *Anſw.* 3 *l.* 17 *s.* 6 *d.* 1 *qr.* $\frac{235}{365}$.

4. What is the Intereſt of 200 *l.* from *Auguſt* 14, to *December* 19 following, at 6 *per Cent. per Annum?* *Anſw.* 4 *l.* 4 *s.* 1 *d.* 3 *qrs.* $\frac{325}{365}$.

5 What is the Intereſt of 10 *l.* for 25 Days, at 5 *per Cent. per Annum?* *Anſw.* 8 *d.* $\frac{80}{365}$.

6. What is the Intereſt of 40 *l.* for 40 Days, at 4 *per Cent. per Annum?* *Anſw.* 3 *s.* 6 *d.* $\frac{30}{365}$.

See more of Simple Intereſt *in* Decimals.

Of Compound INTEREST.

Q. *What is* Compound Intereſt?

A. Compound Intereſt is that which ariſes from any *Principal* and its *Intereſt* put together, as the Intereſt ſtill beomes due; and for that Reaſon it is called *Intereſt* upon *Intereſt*, or *Compound Intereſt.*

Q. *Is it lawful to let out* Mony *at* Compound Intereſt?

A. No: Yet in purchaſing of *Annuities* or *Penſions*, and *Leaſes* in *Reverſion*, it is very uſual to allow *Compound Intereſt* to the Purhaſer for his *ready Mony*; and therefore it is very neceſſary to underſtand it?

Q. *How do you find the* Compound Intereſt *of any given* Sum for any Number of Years?

A. 1. Find the *Amount* of the given Sum by *Simple Intereſt*, for the firſt Year, which is the *Principal* for the ſecond Year; then find the *Amount* of that *Principal* for the ſecond Year, and that is the *Principal* for the third Year; and ſo on for any Number of Years given.

2. Subtract the given Sum from the laſt *Amount*, and the Remainder is the *Compound Intereſt* required.

EXAMPLES.

1. What Sum will 450 *l.* amount to in 3 Years, at 5 *per Cent. per Annum, Compound Intereſt?* *Anſw.* 520 *l.* 18 *s.* 7 *d.* $\frac{1}{2}$.

2. What will 400 *l.* amount to in 4 Years, at 6 *per Cent. per Annum, Compound Intereſt?* *Anſw.* 504 *l.* 19 *s.* 9 *d.* $\frac{1}{4}$.

3. What will 480 *l.* amount to in 6 Years, at 5 *per Cent. per Annum, Compound Intereſt?* *Anſw.* 643 *l.* 4 *s.* 10 *d.* $\frac{1}{2}$.

4. What will 500 *l.* amount to in 4 Years, at 4$\frac{1}{4}$ *per Cent. per Ann. Compound Intereſt?* *Anſw.* 590 *l.* 11 *s.* 5 *d.* $\frac{1}{2}$.

5. What is the Compound Intereſt of 400 *l.* 10 *s.* at 3$\frac{1}{2}$ *per Cent. per Annum* for 3 Years? *Anſw.* 43 *l.* 10 *s.* 9 *d.* $\frac{1}{2}$.

See more of Compound Intereſt *in* Decimals.

Of

Of REBATE *or* DISCOUNT.

Q. WHAT *is* Rebate *or* Diſcount?

A. Rebate or *Diſcount* is when a Sum of Mony due at any Time to come, is ſatisfied by paying ſo much preſent Mony, as being put out to *Intereſt*, would amount to the given *Sum* in the ſame Space of *Time*.

Q. *How is the* Operation *perform'd?*

A. 1. As 12 Months
Are to the *Rate per Cent.* :
So is the *Time* propoſed
To a *fourth Number*.
2. Add that *fourth Number* to 100*l.*
3. As that *Sum*
Is to the *fourth Number* :
So is the given *Sum*
To the *Rebate*.
4. Subtract the *Rebate* from the given *Sum*, and the *Remainder* is the *preſent Worth*. Or thus,
3. As that *Sum*
Is to 100*l.* :
So is the given *Sum*
To the *preſent Payment*.
4. Subtract the *preſent Worth* from the given *Sum*, and the *Remainder* is the *Rebate*.

Q. *How do you prove* Queſtions *in* Rebate?

A. Find the *Amount* of the *preſent Payment* at the *Time* and *Rate per Cent.* given, and that will be equal to the given *Sum*.

EXAMPLES.

1. What is the Rebate of 795*l.* 11*s.* 2*d.* for 11 Months, at 6 *per Cent.*? *Anſw.* 41*l.* 9*s.* 5*d.* 3*qrs.* $\frac{1572}{2532}$.

2. What is the preſent Worth of 161*l.* 10*s.* for 19 Months, at 5 *per Cent.*? *Anſw.* 149*l.* 13*s.* 0*d.* $\frac{3}{4}$.

3. Sold Goods for 795*l.* 11*s.* 2*d.* to be paid 4 Months hence, what is the preſent Worth, at $3\frac{1}{2}$ *per Cent.*? *Anſw.* 786*l.* 7*s.* 8*d.* $\frac{1}{4}$.

4. What is the preſent Worth of 4000*l.* payable in 9 Months, at $4\frac{3}{4}$ *per Cent.*? *Anſw.* 3862*l.* 8*s.* 0*d.* $\frac{1}{2}$.

5. How much ready Mony for a Note of 18*l.* due 15 Months hence, at 5 *per Cent.*? *Anſw.* 16*l.* 18*s.* 10*d*

6. Suppoſe 810*l.* were to be paid 3 Months hence, allowing 5 *per Cent.* Diſcount, what muſt be paid in hand? *Anſw.* 800*l.*

7. If a Legacy of 1000*l.* is left me *July* 24, 1761, to be paid on the *Chriſtmas Day* following; what muſt I receive, when I allow 6 *per Cent.* for preſent Payment? *Anſw.* 975*l.* 3*s.* 1*d.*

8. Being obliged by a Bond bearing date *Auguſt* 29, 1757, to pay next *Midſummer* 326*l.* what muſt I pay down, if they allow Diſcount after the Rate of 8 *per Cent.*? *Anſw.* 305*l.* 16*s.* 6*d.* ¼.

9. Sold Goods for 312*l.* to be paid at two three Months, (that is, half at 3 Months, and the other half at 3 Months after that) what muſt be diſcounted for the preſent Payment, at 5 *per Cent.*? *Anſw.* 5*l.* 14*s.* 7*d.*

10. Sold Goods for 300*l.* to be paid at three two Months, (that is, one third at 2 Months, one third at 4 Months, and one third at 6 Months) what muſt be diſcounted for preſent Payment at 4 *per Cent.*? *Anſw.* 3*l.* 18*s.* 9*d.*

11. What is the preſent Worth of 100*l.* at 5 *per Cent.* payable at two four Months? *Anſw.* 97*l.* 11*s.* 4*d.* ½.

12. I would know the preſent Worth of 150*l.* payable at three four Months, at 5 *per Cent.* Diſcount? *Anſw.* 145*l.* 3*s.* 9*d.* ¼.

13. What is the preſent Worth of 200*l.* at 4 *per Cent.* payable as follows, *viz.* 100*l.* at 2 Months; 50*l.* at 3 Months; and 50*l.* at 5 Months? *Anſw.* 198*l.* 0*s.* 6*d.*

Of EQUATION *of* PAYMENTS;

The common Way.

Q. WHAT *is* Equation *of* Payments?

A. When ſeveral Sums of Mony, to be paid at different Times, are reduced to one mean Time for the Payment of the Whole, without Loſs to *Debtor* or *Creditor*, this is called *Equation* of *Payments*.

Q. *Wherein may the* Debtor *or* Creditor *be ſaid to ſuffer Loſs, when the Debt is paid?*

A. 1. When one *mean Time* is aſſigned for the Payment of the whole Debt, and the Mony is not paid till ſome time afterwards; then the *Debtor* ſuffers *Loſs* by paying not only the *Principal*, or Sum due, but alſo the *Intereſt* of that Sum for the Time of Forbearance, at 3, 4, or more *per Cent.* as they ſhall agree. Likewiſe, if the Mony be paid before it is due, then the *Creditor* ſuffers *Loſs* by allowing ſo much *per Cent.* by Agreement, for the Time of *prompt Payment*.

2. The *Loſs* to either Party, may be in reducing the ſeveral Times of Payment to one, which is not the true equated *Time*; and then if the *Payment* be made after the true Time, the *Creditor* ſuffers *Loſs*, becauſe he receives no *Intereſt* for it: If the Time agreed on be before the true Time, then the *Debtor* ſuffers *Loſs*, becauſe he receives no *Intereſt* for his early Payment.

Q. *How is the Operation wrought?*

A. Multiply each Payment by its Time, and divide the Sum of all the Products by the whole Debt, the Quotient is the *equated Time.*

EXAMPLES.

1. *A* owes *B* 100 *l.* whereof 50 *l.* is to be paid at 2 Months, and 50 *l.* at 4 Months; but they agree to reduce them to one Payment; when muſt the whole be paid? *Anſw.* 3 *Months.*

2. A Merchant hath owing him 300 *l.* to be paid as follows: 50 *l.* at 2 Months, 100 *l.* at 5 Months, and the reſt at 8 Months; and it is agreed to make one Payment of the Whole; I demand when that Time muſt be? *Anſw.* 6 *Months.*

3. *F* owes to *H* 1000 *l* whereof 200 *l.* is to be paid preſent, 400 *l.* at 5 Months, and the reſt at 10 Months, but they agree to make one Payment of the Whole; I demand the equated Time? *Anſw.* 6 *Months.*

4. *K* is indebted to *L* a certain Sum, which is to be diſcharged at 4 ſeveral Payments, that is, $\frac{1}{4}$ at 2 Months, $\frac{1}{4}$ at 4 Months, $\frac{1}{4}$ at 6 Months, and $\frac{1}{4}$ at 8 Months; but they agreeing to make but one Payment of the Whole, the equated Time is therefore demanded? *Anſw.* 5 *Months.*

5. *H* bought of *X* a Quantity of Goods upon Truſt, for which *H* was to pay $\frac{1}{3}$ of the Debt every 3 Months, till the Whole was diſcharged; but they afterwards agreed to pay the Whole at one equated Time; the Time is demanded? *Anſw.* 6 *Months.*

6. *W* owes *Z* a Sum of Mony, which is to be paid, $\frac{1}{2}$ preſent, $\frac{1}{4}$ at 4 Months, and the reſt at 8 Months, what is the equated Time for the Whole? *Anſw.* 3 *Months.*

7. *P.* owes *Q* 420 *l.* which will be due 6 Months hence; but *P* is willing to pay him 60 *l.* now, provided he can have the reſt forborn a longer Time: It is agreed on; the Time of Forbearance therefore is required? *Anſw.* 7 *Months.*

Note, *This* Queſtion *is in* Reverſe Proportion. *See more of this* Rule in Decimals.

Of BARTER.

Q. W*HAT is* Barter?

A. Barter is the Exchanging of one *Commodity* for another, and informs Merchants ſo to proportion their *Quantities*, as that neither may ſuſtain *Loſs*.

Q. *How do you prove Queſtions in* Barter?

A. By changing the Order of them.

EXAMPLES.

1. How much Sugar, at 9*d. per lb.* muſt be given in Barter for 6 *C.* $\frac{1}{2}$ of Tobacco, at 14*d. per lb.? Anſw.* 10 *C.* 0 *qr.* 12 *lb.* $\frac{4}{9}$.

2. What Quantity of Tea, at 10*s. per lb.* muſt be given in Barter for 1 *C.* of Chocolate, at 4ſ. *per lb.? Anſw.* 44 *lb.* 12 *oz* $\frac{8}{10}$.

3. How much Rice at 28*s. per C.-wt.* muſt be bartered for 3 *C.* $\frac{1}{2}$ of Raiſins, at 5 *d. per lb.? Anſw.* 5 *C.* 3 *qrs.* 9 *lb.* $\frac{112}{336}$.

4. *A* and *B* bartered: *A* had 5 *C.* of Sugar, at 6 *d. per lb.* which he gave to *B* for a Quantity of Cinnamon, at 10ſ. 8*d. per lb.* I demand how much Cinnamon *B* gave *A*? *Anſw.* 26 *lb.* 4 *oz.*

5. *B* delivered 3 *Hhds.* of Brandy, at 6ſ. 8 *d. per* Gallon, to *C* for 126 Yards of Cloth; what was the Cloth *per* Yard? *Anſw.* 10ſ.

6. *A* and *B* bartered: *A* had 12 *C.* of Sugar, worth 4*d. per lb.* for which *B* gave him 1 *C.* $\frac{3}{4}$ of Cinnamon; I demand how *B* rated his Cinnamon *per lb.? Anſw.* 27 *d.* $\frac{84}{196}$.

7. *A* hath Linen Cloth worth 20*d.* an Ell ready Mony; but in Barter he would have 2ſ. *B* hath broad Cloth worth 14ſ. 6*d. per* Yard ready Mony; at what Price ought the broad Cloth to be rated in Barter? *Anſw.* 17ſ. 4*d.* 3 *qrs.* $\frac{4}{20}$ *per* Yard.

8. *A* and *B* barter: *A* hath 41 *C. wt.* of Hops, at 30ſ. *per C.* for which *B* gave him 20 *l.* in Mony, and the reſt in Prunes, at 5 *d. per lb.* I demand how many Prunes *B* gave *A*, beſides the 20 *l.*? *Anſw.* 17 *C.* 3 *qrs.* 4 *lb.*

9. *C* hath Candles, at 6ſ. *per* Dozen ready Mony; but in Barter he will have 6ſ. 6*d. per* Dozen; *D* hath Cotton at 9*d. per lb.* ready Mony; I demand what Price the Cotton muſt be at in Barter; alſo how much Cotton muſt be bartered for 100 Dozen of Candles? *Anſw. The Cotton is* 9 *d.* 3 *qrs. per lb. in Barter; and* 7 *C.* 0 *qr.* 16 *lb. of Cotton muſt be given for* 100 *Dozen of Candles.*

Of LOSS *and* GAIN.

Q. W*HAT is* Loſs *and* Gain?

A. Loſs and *Gain* is a Rule which teacheth *Merchants* what they ſhall *gain* or *loſe* in the Sale of their Goods, having the *Price* that they bought them for, and the *Price* for which they are to be ſold, both known.

Q. *How are the following* Queſtions *proved?*

A. Let them be varied.

EXAMPLES.

1. Bought 18*C.* of Cheeſe, at 28*s. per C.* which I ſell out again at 3*d.*$\frac{1}{2}$ *per lb.* what is the Profit in the Whole? *Anſw.* 4*l.* 4*s.*

2. If I buy Deals in at 20*d.* a-piece, and ſell them again at 17*d.* what ſhall I loſe by 120 Dozen? *Anſw.* 18*l.*

3. Hats bought at 4*s.* a-piece, and ſold again at 4*s.* 9*d.* what is the Profit in laying out 100*l.*? *Anſw.* 18*l.* 15*s.*

4. Bought 19 Fother of Lead, at 14*s. per C.* what is gained by the Whole, ſold out at 4*d. per lb.*? *Anſw.* 432*l.* 5*s.*

5. Bought 60 Reams of Paper, at 15*s. per* Ream, what is the Loſs in the whole Quantity, at 4 *per Cent.*? *Anſw.* 1*l.* 10*s.*

6. Bought 7 Tuns of Wine, at 17*l. per Hhd.* which I ſell again at 1*s. per* Pint; I demand the whole Gain, and the Gain *per Cent.*? *Anſw.* 229*l.* 12*s. whole Gain; and* 48*l.* 4*s.* 8*d.* 1*qr.* $\frac{420}{476}$ *the Gain per Cent.*

7. If I ſell 500 Deals at 15*d.* a-piece, and 9*l. per Cent.* Loſs; what do I loſe in the whole Quantity? *Anſw.* 2*l.* 16*s.* 3*d.*

8. Bought 3 Oxen for 24*l.* 10*s.* which I ſell again for 2*s. per* Stone; what ought the 3 Oxen to weigh together, the Hides and Offal being the only clear Gain? *Anſw.* 245 *Stone.*

9. A Draper bought 100 Yards of broad Cloth, for which he gave 56*l.* I deſire to know how he muſt ſell it *per* Yard, to gain 19*l.* in the Whole? *Anſw.* 15*s. per Yard.*

10. A Draper bought 100 Yards of broad Cloth for 56*l.* I demand how he muſt ſell it *per Yard*, to gain 15*l.* in laying out 100*l.*? *Anſw.* 12*s.* 10*d.* 2*qrs.* $\frac{24}{100}$.

Of FELLOWSHIP.

Q. H*OW many ſorts of* Fellowſhip *are the there?*

A. Two: *Single* and *Compound.*

Of SINGLE FELLOWSHIP.

Q. *What is* Single Fellowſhip?

A. Single Fellowſhip is when the Stocks of each Partner continue for an equal Term of Time.

Q. *What is the* Rule?

A. As the *Sum* of the ſeveral *Stocks*
Is to the *Total Gain* or *Loſs*:
So is each Man's Share in *Stock*
To his *Share* of the *Gain* or *Loſs*:

Q. *How is this* Rule *proved?*

A. Add all the *Shares* together, and the *Sum* will be equal to the given *Gain* or *Loſs*.

Note, *This Way of proving* Fellowſhip, *will not hold good always: For if an* Error *ſhould be committed in the Beginning of the Work, and carried on thro' the whole Operation, yet the ſame will prove, tho' each Man's* Share *of the* Gain *or* Loſs *aſſigned him by that Operation, be either more or leſs than his true* Share. *The moſt exact Method, then, that I would propoſe, tho' ſomething more tedious, is to change the Order of the Queſtion, and put each Man's Share of the* Gain *or* Loſs *in the Place of his* Stock *firſt laid out, and make the* Sum *of the* Stocks *ſtand in the Place of the* whole Gain *or* Loſs; *and then it will be,*

As the *Total Gain* or *Loſs*
Is to the *Sum* of the ſeveral *Stocks*:
So is each Man's *Share* of the *Gain* or *Loſs*
To his particular *Share* in *Stock.*

Q. *What elſe doth this Rule belong to beſide* Fellowſhip?

A. By it the Eſtate of a Bankrupt may be divided among his Creditors: Alſo Legacies may be adjuſted, when there is a Deficiency of Aſſets or Effects.

EXAMPLES.

1. *A* and *B* were Sharers in a Parcel of Merchandize, in the Purchaſe of which, *A* laid out 3 *l.* and *B* 7 *l.* and the Commodity being ſold, they find their clear Gain amount to 25*s.* what Part of it muſt each Man have? *Anſw. A muſt have* 7*s.* 6*d.* and *B* 17*s.* 6*d.*

2. *A*, *B*, and *C*, trading together, gain'd 120*l.* which is to be ſhar'd according to each Man's Stock; *A* put in 140*l.* *B* 300*l.* and *C* 160*l.* what is each Man's Share? *Anſw. A* 28*l.* *B* 60*l.* *C* 32*l.*

3. Three Merchants trading to *Virginia*, loſt Goods to the Value of 800*l.* Now if *A*'s Stock was 1200*l.* *B*'s 4800*l.* and *C*'s 2000*l.* what Sum did each Man loſe? *Anſw. A loſt* 120*l.* *B* 480*l.* *C* 200*l.*

4. Three Merchants traded together, and they put into one common Stock 1000*l.* each Man, and gained 600*l.* how much muſt each Man have? *Anſw.* 200*l. each Man.*

5. Four Men traded with a Stock of 800*l.* and they gain'd in two Years Time twice as much and 40*l.* over; *A*'s Stock was 140*l.* *B*'s 260*l.* *C*'s 300*l.* I demand *D*'s Stock, and what each Man gain'd by Trading? *Anſw. D's Stock was* 100*l. and A gain'd* 287*l.* *B* 533*l.* *C* 615*l. and D* 205 .

6. *A*, *B*, and *C*, trading to *Guinea* with 480*l.* 680*l.* and 840*l.* in three Years Time did gain 1010*l.* how much is each Man's Share of the Gain? *Anſw. A* 242*l.* 8*s.* *B* 343*l.* 8*s.* *C* 424*l.* 4*s.*

7. *A*, *B*, and *C*, freighted a Ship from the *Canaries* to *England*, with 108 Tuns of Wine, of which *A* had 48; *B* 36; *C* 24; but by reaſon of bad Weather, they were obliged to caſt 45 Tuns overboard; how much muſt each Man ſuſtain of the Loſs; *Anſw. A* 20 *Tuns*, *B* 15 *Tuns*, *C* 10 *Tuns.*

8. A Merchant is indebted to *S* 70*l.* to *T* 400*l.* to *V* 140*l.* 12*s.* 6*d.* but upon his Deceaſe, his Eſtate is found to be worth no more than 409*l.* 14*s.* how muſt it be divided among his Creditors? *Anſw. S muſt have* 46*l.* 19*s.* 3*d.* 3*qrs.* $\frac{141750}{146550}$.
T – – 268 7 7 1 $\frac{77250}{146550}$.
V – – 94 7 0 2 $\frac{74100}{146550}$.

9. If the Mony and Effects of a Bankrupt amount to 1400*l.* 14*s.* 6*d.* and he is indebted to *A* 742*l.* 12*s.* to *B* 641*l.* 19*s.* 8*d.* and to *C.* 987*l.* 19*s.* 9*d.* how muſt it be divided among them? *Anſw. A muſt have* 438*l.* 8*s.* 4*d.* 1*qr.* $\frac{303527}{369417}$.
B – – – 379 0 3 3 $\frac{358361}{369417}$.
C – – – 583 5 9 3 $\frac{107529}{369417}$.

Of COMPOUND FELLOWSHIP.

Q. *What is* Compound Fellowſhip?

A. *Compound Fellowſhip* is when the *Stocks* continue an unequal Term of Time.

Q. *What is the* Rule?

A. 1. Multiply each Man's *Stock* and *Time* together.
2. Add the ſeveral *Products* thence ariſing together.
3. As the *Sum* of thoſe *Products*
Is to the whole *Gain* or *Loſs*:
So is each *Product*
To its *Share* of the *Gain* or *Loſs.*

Q. *How is this* Rule *proved?*

A. As in *Single Fellowſhip.*

EXAMPLES.

1. Three Merchants traded together: *A* put in 120*l.* for 9 Months; *B* 100*l.* for 16 Months; and *C* 100*l.* for 14 Months; and they gain'd 100*l.* how muſt it be divided? *Anſw. A muſt have* 26*l.* 9*s.* 4*d.* 3*qrs.* $\frac{3120}{4080}$.
B – – – 39 4 3 3 $\frac{240}{4080}$.
C – – – 34 6 3 1 $\frac{720}{4080}$.

2. Three Merchants join in Trade: *A* put in 400*l.* for 9 Months; *B* 680*l.* for 5 Months; *C* 120*l.* for 12 Months; but by Misfortune loſt Goods to the Value of 500*l.* what muſt each Man ſuſtain of the Loſs?

		l.	*s.*	*d.*	*qrs.*	
Anſw.	*A muſt loſe*	213	5	4	3	$\frac{2840}{8440}$.
	B – – – – –	201	8	5	0	$\frac{7840}{8440}$.
	C – – – – –	85	6	1	3	$\frac{6200}{8440}$.

3. *A*, *B*, and *C*, hold a Paſture in common, for which they pay 20*l.* *per Annum.* In this Paſture *A* had 40 Oxen for 76 Days; *B* had 36 Oxen for 50 Days; and *C* had 50 Oxen for 90 Days. I demand what Part every of theſe Tenants ought to pay of the 20*l.*?

		l.	*s.*	*d.*	*qrs.*	
Anſw.	*A ought to pay*	6	10	2	1	$\frac{2340}{9340}$.
	B – – – – – –	3	17	1	0	$\frac{2000}{9340}$.
	C – – – – – –	9	12	8	2	$\frac{5000}{9340}$.

Of the DOUBLE RULE *of* THREE.

Q. BY *what is the* Double Rule *of* Three *known?*

A. By five Terms which are always given in the Queſtion to find a Sixth.

Q. *In what Proportion is the* Sixth *Term to be found?*

A. If the Proportion is *Direct*, the *Sixth Term* muſt bear ſuch Proportion to the *Fourth* and *Fifth*, as the *Third* bears to the *Firſt* and *Second:* But if the Proportion is *Inverſe*, then the *Sixth Term* muſt bear ſuch Proportion to the *Fourth* and *Fifth*, as the *Firſt* bears to the *Second* and *Third*, or as the *Second* bears to the *Firſt* and *Third*.

Note, *It is to be obſerved here, as in the* Single Rule *of* Three, *that* Direct Proportion *is when* more requires more, *or* leſs requires leſs; *and* Inverſe Proportion *is when* more requires leſs, *or* leſs requires more.

Q. *What do you obſerve concerning the* Five *given* Terms?

A. That the *three firſt Terms* are a Suppoſition; the *two laſt* are a Demand.

Q. *How muſt the Numbers given in the* Queſtion *be ſtated?*

A. By two *Single Rules* of *Three: Or otherwiſe, thus;*

1. Let the Principal Cauſe of *Loſs* or *Gain*, *Intereſt* or *Decreaſe*, *Action* or *Paſſion*, be put in the *firſt Place.*

2. Let that which betokeneth *Time*, *Diſtance of Place*, and the like, be put in the *ſecond Place*; and the remaining one in the *third Place.*

3. Place the other *two Terms* under their like in the Suppoſition.

4. If the *Blank* falls under the *third Term,* multiply the *firſt* and *ſecond Terms* for a *Diviſor,* and the other *Three* for a *Dividend.*

5. If the *Blank* falls under the *firſt* or *ſecond Term,* multiply the *third* and *fourth Terms* for a *Diviſor,* and the other *Three* for a *Dividend*; and the *Quotient* will be the Anſwer.

Q. *How are the following Queſtions proved?*

A. Let them be varied; or elſe work the ſame Queſtions by two *Single Rules of Three.*

EXAMPLES.

1. If 7 Men can reap 84 Acres of Wheat in 12 Days; how many Men can reap 100 Acres in 5 Days? *Anſw.* 20 *Men.*

2. If 7 *Qrs.* of Malt are ſufficient for a Family of 7 Perſons for 4 Months; how many *Qrs.* are enough for 46 Perſons 10 Months? *Anſw.* 115 *Qrs.*

3. If 8 Reapers have 3*l.* 4*s.* for 4 Days Work; how much will 48 Men have for 16 Days Work? *Anſw.* 76*l.* 16*s.*

4. If 10 Buſhels of Oats be enough for 18 Horſes 20 Days; how many Buſhels will ſerve 60 Horſes 36 Days? *Anſw.* 60 *Buſh.*

5. If a Footman travels 240 Miles in 12 Days, when the Days are 12 Hours long; how many Days may he travel 720 Miles in, of 16 Hours long? *Anſw.* 27 *Days.*

6. If 56*lb.* of Bread will be ſufficient for 7 Men 14 Days; how much Bread will ſerve 21 Men 3 Days? *Anſw.* 36*lb.*

7. If 700*l.* in half a Year raiſe 14*l.* Intereſt; how much will 400*l.* raiſe in 5 Years? *Anſw.* 80*l.*

8. If 30*s.* be the Hire of 8 Men for 3 Days; how many Days muſt 20 Men work for 15*l.*? *Anſw.* 12 *Days.*

9. If 4 Reapers have 24*s.* for 3 Days Work; how many Men will earn 4*l.* 16*s.* in 16 Days? *Anſw.* 3 *Men.*

10. An Uſurer put out 86*l.* to receive Intereſt for the ſame; and when it had continued 8 Months, he received for Principal and Intereſt 88*l.* 17*s.* 4*d.* I demand at what Rate *per Cent. per Annum* he received Intereſt? *Anſw.* 5 *l. per Cent.*

11. What is the Intereſt of 200*l.* for 3 Years and $\frac{3}{4}$, at 5 *per Cent. per Annum? Anſw.* 37*l.* 10*s.*

12. What is the Intereſt of 400*l.* for a Week, at 5 *per Cent. per Annum? Anſw.* 7*s.* 8*d.* 1*qr.* $\frac{12}{52}$.

13. What is the Intereſt of 120*l.* for 126 Days, at 4 *per Cent. per Annum? Anſw.* 1*l.* 13*s.* 1*d.* 2*qrs.* $\frac{258}{365}$.

Note, *The* Rule *for working Queſtions in* Simple Intereſt *for* Days, p. 67, *is taken from this* Rule, *as appears by this laſt Example.*

Of CONJOIN'D PROPORTION.

Q. *What is* Conjoin'd Proportion?

A. Conjoin'd Proportion is when the *Coins*, *Weights*, or *Meaſures* of ſeveral Countries are compared in the ſame Queſtion; or it is a linking together of many *Proportions.*

CASE 1.

Q. *When it is required to know how many of the* firſt *ſort of* Coin, Weight *or* Meaſure, *mentioned in the* Queſtion, *are equal to a given Number of the* laſt; *how muſt the* Queſtion *be anſwered?*

A. 1. Place the Numbers alternately, beginning at the *left Hand*; and let the laſt Number ſtand on the *left Hand.*

2. Multiply the *firſt Rank* continually for a Dividend, and the *ſecond* for a Diviſor.

Note, *See the* Note *in Compariſon of Weights and Meaſures,* p. 82. *for the Reaſon of this* Rule.

Q. *How is* Conjoin'd Proportion *proved?*

A. Make as many *Single Rules* of *Three* as the Nature of the Queſtion requires.

EXAMPLES.

1. If 100 *lb. Engliſh* make 95 *lb. Flemiſh*; and 19 *lb. Flemiſh* 25 *lb.* at *Bolonia*; how many *lb. Engliſh* are equal to 50 *lb.* at *Bolonia? Anſw.* 40 *lb.* Engliſh.

2. If 25 *lb.* at *London* be 22 *lb.* at *Nurenburgh*; 88 *lb.* at *Nurenburgh* 92 *lb.* at *Hamburgh*; 46 *lb.* at *Hamburgh* 49 *lb.* at *Lyons*; how many *lb.* at *London* are equal to 98 *lb.* at *Lyons? Anſw.* 100 *lb.*

3. If 6 Braces at *Leghorn*, make 3 Ells *Engliſh*; 5 Ells *Engliſh* 9 Braces at *Venice*; how many Braces at *Leghorn* will make 45 Braces at *Venice? Anſw.* 50 *Braces at* Leghorn.

4. If 3 Ells *Engliſh* make 6 Braces at *Leghorn*; and 150 Braces at *Leghorn* 135 Braces at *Venice*; how many Ells *Engliſh* are equal to 27 Braces at *Venice? Anſw.* 15 *Ells* Engliſh.

CASE 2.

Q. *When it is required to know how many of the* laſt *ſort of* Coin, Weight *or* Meaſure, *mentioned in the* Queſtion, *are equal to a given Number of the* firſt; *how muſt the* Queſtion *be anſwered?*

A. 1. Place the Numbers alternately, as in *Caſe* 1, but let the laſt Number ſtand on the *right Hand.*

2. Multiply the *ſecond Rank* for a Dividend, and the *firſt* for a Diviſor.

EXAMPLES.

1. If 10 *lb.* at *London* make 9 *lb.* at *Amſterdam*; 90 *lb.* at *Amſterdam* 112 *lb.* at *Thoulouſe*; how many *lb.* at *Thoulouſe* are equal to 50 *lb.* at *London? Anſw.* 56 *lb. at* Thouloufe.

2. If 20 Braces at *Leghorn* be equal to 10 Vares at *Liſbon*; 40 Vares at *Liſbon* to 80 Braces at *Lucca*; how many Braces at *Lucca* are equal to 100 Braces at *Leghorn? Anſw.* 100 *Braces at* Lucca.

Of EXCHANGE.

Q. WHAT *is* Exchange?

A. Exchange is the giving of the *Mony, Weight,* or *Meaſure* of one Country, for the like Value in *Bills, Mony, Weight,* or *Meaſure* of another Country.

Q. *What is the* Courſe of Exchange?

A. It is the *Value* of Mony agreed on among Merchants.

Q. *Is the* Courſe *of* Exchange *always the ſame?*

A. No: The *Courſe* of *Exchange* riſes or falls almoſt every Day, according as Mony is plenty or ſcarce; or according to the *Time* allowed for Payment of the *Mony* in *Exchange,* and then the Value is ſaid to be above or under *Par.*

Q. *What is the* Par *of* Exchange?

A. It is the intrinſic Value of any *Foreign Mony* compared with *Sterling Mony.*

Q. *How are Queſtions in* Exchange *proved?*

A. By changing the Order of them.

CASE I.

Q. *What Places does* London *exchange with in* Dollars, *or Pieces of Eight of* Mexico?

A. With *Madrid,* and *Cadiz* in *Spain;* and with *Genoa,* and *Leghorn* in *Italy.*

Q. *How do they keep their Accompts in* Spain?

A. In *Rials* and *Marvedies.*

Note, 372 *Marvedies make* 1 *Rial.*
8 *Rials* - - - - 1 *Piece of Eight.*

Q. *How do they keep their Accompts in* Italy?

A. In *Livres, Sols,* and *Deniers.*

Note, 12 *Deniers make* 1 *Sol.*
20 *Sols* - - - - 1 *Livre.*
5 *Livres* - - - 1 *Piece of Eight at* Genoa.
6 *Livres* - - - 1 *Piece of Eight at* Leghorn.

EXAMPLES.

1. What is the Amount of 63*l.* Sterling, in Pieces of Eight, at 56*d. per* Piece? *Anſw.* 270 *Pieces of Eight.*

2. A Factor hath ſold Goods at *Cadiz* for 1468 Pieces of Eight, at 4*s.* 6*d.* 2*qrs. per* Piece; how much Sterling is the Sum? *Anſw.* 333*l.* 7*s.* 2*d.*

CASE 2.

Q. *What Place does* London *exchange with in* Ducats?

A. With *Venice* in *Italy.*

Note, 6 *Solidi make* 1 *Groſs.*
24 *Groſſes* - - 1 *Ducat.*

EXAMPLES.

1. There are 2000 Ducats, at 4*s.* 4*d.* each, remitted to *London* to be paid in Pounds Sterling; what is the Amount? *Anſw.* 433*l.* 6*s.* 8*d.*

2. A Bill of 100*l.* Sterling is remitted to *Venice* to be paid in Ducats, at 4*s.* 4*d.* each; what is the Amount? *Anſw.* 461 $\frac{28}{52}$ *Ducats.*

3. A Traveller would exchange 233*l.* 16*s.* 8*d.* Sterling for *Venice* Ducats, at 4*s.* 9*d. per* Ducat; how many muſt he have; *Anſw.* 984 $\frac{32}{57}$ *Ducats.*

CASE 3.

Q. *What Places does* London *exchange with for* French Crowns?

A. With *Paris, Lyons, Rouen,* &c. in *France.*

Q. *How do they keep their Accompts in* France?

A. In *Livres, Sols* and *Deniers.*

Note, 12 *Deniers make* 1 *Sol.*
20 *Sols* - - - - 1 *Livre.*
3 *Livres* - - - 1 *Crown.*

EXAMPLES.

1. A Bill of 200*l.* is remitted to *Paris* by a Merchant in *London*; what is the Value in *French* Crowns, at 4*s.* 6*d.* each? *Anſw.* 888 $\frac{48}{54}$ *Crowns.*

2. There are 800 *French* Crowns, at 4*s.* 6*d.* each, remitted to *London* by a Merchant in *Paris*; what is the Value in Pounds Sterling? *Anſw.* 180*l. Sterling.*

CASE 4.

Q. *What Places does* London *exchange with for* Mill-Reas?

A. With *Oporto* and *Liſbon,* &c. in *Portugal*; and with the Iſland of *Madeira.*

Q. *How do they keep their Accompts in* Portugal?

A. In *Reas.*

Note, 1000 *Reas make* 1 *Mill-Rea.*

EXAMPLES.

1. If a Bill is drawn from *Liſbon* of 1432 Mill-Reas, at 6*s.* 8*d. per* Piece; how much *Engliſh* Mony is that Bill? *Anſw.* 477*l.* 6*s.* 8*d.*

2. If a Bill be drawn from *London* of 1333*l.* 6*s.* 8*d.* Sterling; how much is it at *Liſbon* in Mill Reas, at 6*s.* 8*d.* each? *Anſw.* 4000 *Mill-Reas.*

CASE 5.

Q. *What Place does* London *exchange with for* Duccatoons?

A. With *Florence* in *Italy*.

EXAMPLES.

1. A Bill of 120 Duccatoons is remitted from *Florence*, at 53*d.* each; what is the Value in Pounds Sterling? *Anſw.* 26*l.* 10*s.*

2. A Bill of 220*l.* 16*s.* 8*d.* is drawn from *London*; what is the Value at *Florence* in Duccatoons, at 53*d.* each? *Anſw.* 1000 *Duccatoons.*

CASE 6.

Q. *What Place does* London *exchange with for* Florins?

A. With *Frankfort* in *Germany*.

EXAMPLES.

1. If 247*l.* 18*s.* 4*d.* Sterling, be remitted to *Frankfort*, what is the Value in Florins, at 59*d.*$\frac{1}{2}$? *Anſw.* 1000 *Florins.*

2. If 100 Florins, at 59*d.*$\frac{1}{2}$ each, be remitted from *Frankfort* to *London*; what is the Value in Pounds Sterling? *Anſw.* 24*l.* 15*s.* 10*d.*

CASE 7.

Q. *What Places does* London *exchange with by the* Pound Flemiſh *or* Pound Sterling?

A. With *Antwerp*, *Bruſſels*, *Amſterdam*, *Rotterdam*, and all Parts of the *Spaniſh* and *United Provinces*. Alſo with *Hamburg* in *Germany*.

Q. *How do they keep their Accompts in theſe Places?*

A. Some in *Pounds*, *Shillings*, and *Pence*, as in *England*; and others in *Guilders*, *Stivers*, and *Pennics*.

Note, 16 *Pennics make* 1 *Stiver.*
20 *Stivers* - - 1 *Guilder*, Alſo
6 *Stivers* - - 1 *Shilling.*
6 *Guilders* - - 1 *Pound Flemiſh.*

EXAMPLES.

1. Being deſirous to remit to my Correſpondent at *London* the Sum of 2000*l.* 12*s.* 6*d.* *Flemiſh*, to diſpoſe of according to my Order; Exchange at 34*s.* 6*d.* *Flemiſh*, *per* Pound Sterling; how much Mony Sterling ſhall I be Creditor for, in the City of *London* aforeſaid? *Anſw.* 1159*l.* 15*s.* 7*d.* 3*qrs.* $\frac{120}{414}$.

2. My Correſpondent in *England* gives me Notice that he has diſburſed in Merchandize, upon my Account, the Sum of 1000*l.* Sterling; what Sum muſt I anſwer for that in *Holland*, the Courſe of Exchange being at 33*s.* 4*d.* *Flemiſh* for one Pound Sterling? *Anſw.* 1666*l.* 13*s.* 4*d.* *Flemiſh.*

Note, *When the* Courſe *of* Exchange *is at* 33*s.* 4*d.* Flemiſh *for* 1 *Pound* Sterling, *then to bring* Flemiſh Mony *into* Engliſh Mony, *multiply the* Flemiſh Mony *by* 3, *and divide that Product by* 5, *the Quotient will give* Pounds Sterling. *And the Contrary.*

3. My Correſpondent in *Rotterdam* ſends me Word, that he has diſburſed upon my Account, the Sum of 3060 Guilders and 15 Stivers; what Sum muſt I anſwer for that at *London*, the Courſe of Exchange being at 37*s.* 9*d.* *Flemiſh per* Pound Sterling? *Anſw.* 270*l.* 5*s.* 3*d.* 2*qrs.* $\frac{138}{453}$.

Note, *A* Stiver *is* 2 *d.* *Flemiſh, and a* Guilder 40 *d.*

4. A Merchant delivered at *London* 120*l.* Sterling, to receive 147*l.* *Flemiſh*, in *Amſterdam*; how much was 1*l.* valued at in *Flemiſh* Mony? *Anſw.* 1*l.* 4*s.* 6*d.*

CASE 8.

Of the Compariſon of WEIGHTS *and* MEASURES.

EXAMPLES.

1. If 112*lb.* at *London* make 99*lb.* at *Liſbon*; how many *lb.* at *London* are equal to 1049*lb.* at *Liſbon?* *Anſw.* 1186*lb.* $\frac{74}{99}$.

2. If 112*lb.* at *London* make 98*lb.* at *Roan*; how many *lb.* at *Roan* are equal to 1000*lb.* at *London?* *Anſw.* 875*lb.*

3. If 100 Ells *Engliſh* make 108 Braces at *Venice*; how many Ells *Engliſh* are equal to 1000 Braces at *Venice?* *Anſw.* 925 *Ells* $\frac{100}{108}$.

4. If 100 Ells at *London* make 145 Ells at *Vienna*; how many Ells at *Vienna* are equal to 10 Ells at *London?* *Anſw.* 14 *Ells* $\frac{1}{2}$.

Note, *Hence appears the Reaſon of thoſe* Rules, *laid down in* Conjoin'd Proportion, *for placing the laſt Number in the Queſtion either on the* right Hand, *or the* left, *as the Nature of the Queſtion requires.*

```
        lb.Liſ. lb.Lon. lb.Liſ.
Ex. 1.   99  :  112  : : 1049
                lb.        lb.
                112   =    99
              1049
        lb.Lon. lb.R.  lb.Lon.
Ex. 2.   112 :  98   : : 100
         lb.    lb.
         112 = 98
              1000
```

Of ALLIGATION.

Q. HOW *many kinds of* Alligation *are there?*

A. Two: *Alligation Medial*, and *Alligation Alternate.*

Of ALLIGATION MEDIAL.

Q. *What is* Alligation Medial?

A. Alligation Medial is when the Quantities and Prices of ſeveral Things are given to find the mean Price of the Mixture compounded of thoſe Things.

Q. *What is the* Rule?

A. As the *whole Compoſition*
Is to its *Total Value:*
So is any *Part* of the *Compoſition*
To its *mean Price.*

Q. *How is* Alligation Medial *proved?*

A. Find the Value of the whole Mixture at the *mean Rate*; and if it agrees with the Total Value of the ſeveral Quantities, at their reſpective Rates, the Work is right.

EXAMPLES.

1. A Farmer mingled 19 Buſhels of Wheat, at 6*s. per* Buſhel, and 40 Buſhels of Rye, at 4*s. per* Buſhel, and 12 Buſhels of Barly, at 3*s. per* Buſhel together; I demand what a Buſhel of this Mixture is worth? *Anſw.* 4*s.* 4*d.* 1 *qr.* $\frac{41}{71}$.

2. A Farmer mingled 20 Buſhels of Oats, at 2*s. per* Buſhel, and 30 Buſhels of Beans, at 2*s. per* Buſhel, and 20 Buſhels of Peas, at 3*s. per* Buſhel together; I demand the Worth of a Buſhel of this Mixture? *Anſw.* 2*s.* 3*d.* 1 *qr.* $\frac{5}{7}$.

3. A Vintner mingled 5 Gallons of Canary, at 8*s. per* Gallon, and 6 Gallons of Malaga, at 7*s. per* Gallon, and 4 Gallons of white Wine, at 6*s. per* Gallon together? I demand what a Gallon of this Mixture is worth? *Anſw.* 7*s.* 0*d.* 3 *qrs.* $\frac{1}{5}$.

4. A Grocer mingled 2*C.* of Sugar, at 56*s. per C.* and 1*C.* at 43*s. per C.* and 2*C.* at 50*s. per C.* together; I demand the Price of 3 *C.* of this Mixture? *Anſw.* 7*l.* 13*s.*

5. An Alehouſe-keeper mixed 3 ſorts of Ale together, *viz.* 12 Gallons, at 6*d. per* Gallon, 16 Gallons, at 7*d. per* Gallon, and 21 Gallons, at 9*d. per* Gallon; I demand what 1 Gallon of this Mixture is worth? *Anſw.* 7*d.* 2 *qrs.* $\frac{22}{49}$.

6. A Refiner having 5 *lb.* of Silver Bullion, of 8 *oz.* fine; 10 *lb.* of 7 *oz.* fine, and 15 *lb.* of 6 *oz.* fine, would melt all together; I demand what Fineneſs 1 *lb.* of this Maſs ſhall be? *Anſw.* 6 *oz.* 13 *dwts.* 8 *gr. fine.*

7. A Mint-maſter hath 3*lb.* Weight of Gold, of 22 Carrats fine, and 3 *lb.* of 20 Carrats fine; I demand what Fineneſs an *oz.* of this Mixture will bear? *Anſw.* 21 *Carrats fine.*

8. An Hoſtler mixing Provinder for his Horſes, would put in a Quantity of Beans, at 5*s. per* Buſhel, with the like Quantity of Oats, at 3*s.* 6*d. per* Buſhel; I demand the Price of a Buſhel of this Mixture? *Anſw.* 4*s.* 3*d.*

9. A Malſter hath ſeveral ſorts of Malt, *viz.* one ſort at 4*s.* 6*d.* another at 4*s.* and a third at 3*s.* 6*d. per* Buſhel, and

he would mix an equal Quantity of each together; I demand the Price of a Buſhel of this Mixture? *Anſw.* 4 *s.*

10. A Brewer had ſeveral ſorts of Ale, *viz.* one ſort of 20*s. per* Barrel; another at 25*s.* a third at 30*s.* and a fourth at 35*s. per* Barrel; and he would mix an equal Quantity of each together; I demand the Price of a Barrel, and alſo of a Gallon of this Mixture? *Anſw.* 27*s.* 6*d. per* Barrel, and 10*d.* 1*qr.* $\frac{8}{31}$ *per* Gallon.

Of ALLIGATION ALTERNATE.

Q. *What is* Alligation Alternate?

A. Alligation Alternate is, when the Rates of ſeveral Things are given to find ſuch Quantities of them, as are neceſſary to make a *Mixture*, which may bear a certain Rate propounded,

Q. *How are the Rates, or Prices of the given Things to be ordered?*

A. 1. They muſt be placed one over the other, and the propounded *Price* of the *Compoſition* againſt them; thus,

$$\textit{Mean Rate } 7 \left\{ \begin{array}{l} 4 \textit{ Prices} \\ 5 \textit{ of the} \\ 6 \textit{ Sim-} \\ 8 \textit{ ples.} \end{array} \right.$$

2. Link the ſeveral *Rates* together, in ſuch ſort, that one *greater* than the *mean Rate* may be coupled to another which is *leſs*.

3. Take the *Difference* between the *mean Rate*, and the ſeveral Prices, and place them each againſt his Yoke-Fellow: And for the reſt, obſerve the following *Caſes*.

CASE I.

Q. *What do you obſerve in this firſt* Caſe?

A. When the *Prices* of the ſeveral *Things* together with the *mean Rate* of the *Mixture* are given, without any *Quantity*, to find how much of each *Ingredient* is required to compoſe the *Mixture*; take the *Difference* between each *Price*, and the *mean Rate*, and ſet them alternately, and they will be the Quantities required.

Q. *How are the Operations in* this *and the following* Caſes *proved?*

A. They are all proved by *Alligation Medial.*

EXAMPLES.

1. How much Rye at 4*s. per* Buſhel, Barly at 3*s. per* Buſhel, and Oats at 2*s. per* Buſhel, will make a Mixture worth 2*s.* 6*d. per* Buſhel? *Anſw.* 6 *Buſhels of Rye,* 6 *Buſhels of Barly, and* 24 *Buſhels of Oats.*

2. How many Raiſins of the Sun, at 7 *d. per lb.* and Malaga-Raiſins at 4 *d. per lb.* may be mixed together for 6 *d. per lb.*?
Anſw. 2 *lb. of Raiſins of the Sun, and* 1 *lb. of Malaga-Raiſins.*

Note, *Queſtions in this Rule do frequently admit of an infinite Variety of* Anſwers, *and all in* whole Numbers; *as in this laſt* Example; *where tho' 2 and 1 do anſwer the* Queſtion, *yet any other* two Numbers *will as truly do the like, that are in the ſame Proportion.*

$$\text{For } 2 : 1 :: \left\{\begin{array}{l} 4 : 2\\ 6 : 3\\ 8 : 4\\ 16 : 8\\ 40 : 20, \text{ \&c. without End.}\end{array}\right.$$

3. A Grocer would mix three ſorts of Sugar together, *viz.* one ſort at 10 *d. per lb.* another at 7 *d.* and another at 6 *d.* how much of each ſort muſt he take, that the whole Mixture may be ſold for 8 *d. per lb.*?

lb. d. lb. d. lb. d.
Anſw. 3 *at* 10; 2 *at* 7, *and* 2 *at* 6 *per lb.*

4. A Malſter hath ſeveral ſorts of Malt, *viz.* one ſort at 4 *s. per* Buſhel, another at 3 *s.* 6 *d.* a third at 3 *s.* and a fourth at 2 *s. per* Buſhel; and he is deſirous to mix ſo much of each ſort together, that the Whole may be ſold at 2 *s.* 6 *d. per* Buſhel; I demand how much he muſt take of each ſort?

Buſh. s. B. s. d. B. s. B. s.
Anſw. 6 *at* 4; 6 *at* 3 6; 6 *at* 3, *and* 36 *at* 2 *per Buſh.*

5. A Druggiſt hath ſeveral ſorts of Tea, *viz.* 1 ſort at 12 *s. per lb.* another at 11 *s.* a third at 9 *s.* and a fourth at 8 *s. per lb.* I demand how much of each ſort he muſt mix together, that the whole Quantity may be afforded at 10 *s. per lb.*?

	lb.	*s.p.lb.*		*lb.*	*s.p.lb.*		*lb.*	*s.p.lb.*
1 *Anſw.*	2 *at*	12	2 *Anſw.*	3 *at*	12	3 *Anſw.*	1 *at*	12
	1 *at*	11		2 *at*	11		2 *at*	11
	1 *at*	9		2 *at*	9		2 *at*	9
	2 *at*	8		3 *at*	8		1 *at*	8

	lb.	*s.p.lb.*		*lb.*	*s.p.lb.*		*lb.*	*s.p.lb.*
4 *Anſw.*	1 *at*	12	5 *Anſw.*	3 *at*	12	6 *Anſw.*	2 *at*	12
	3 *at*	11		1 *at*	11		3 *at*	11
	3 *at*	9		3 *at*	9		1 *at*	9
	1 *at*	8		2 *at*	8		3 *at*	8

7 *Anſw.* 3 *lb. of each Sort.*

Note, *Theſe* Seven Anſwers *ariſe from as many different Ways of linking the* Rates *of the* Simples *together.*

6. How much Alloy muſt I mix with Bullion of 10*oz.* fine to abaſe the ſame to 8*oz.* fine? *Anſw. To every* 8 *oz. of Bullion of* 10 *oz. fine, put* 2 *oz. of Alloy, and that will abaſe it to* 8 *oz. fine.*

CASE 2.

Of Alternation Partial.

Q. *What do you obſerve in this ſecond* Caſe?

A. When the *Rates* of all the *Things*, the *Quantity* of but one of them, and the *mean Rate* of the whole *Mixture* are given to find the ſeveral *Quantities* of the reſt, in Proportion to the *Quantity* given; take the *Differences* between each *Price*, and the *mean Rate*, and place them alternately, as in *Caſe* 1. Then ſay,

As the *Difference* of the ſame *Name* with the *Quantity* given
Is to the reſt of the *Differences* ſeverally:
So is the *Quantity* given
To the ſeveral *Quantities* required.

EXAMPLES.

1. A Man being determined to mix 10 Buſhels of Wheat at 4*s. per* Buſhel, with Rye at 3*s.* with Barly at 2*s.* and with Oats at 1*s. per* Buſhel; I demand how much Rye, Barly, and Oats, muſt be mixed with the 10 Buſhels of Wheat, that the Whole may be ſold for 28*d. per* Buſhel?

1 *Anſw.*
B. *p.*
2 2 *of Rye*
5 0 *of Barly*
12 2 *of Oats*

2 *Anſw.*
B.
40 *of Rye*
50 *of Barly*
20 *of Oats*

3 *Anſw.*
B.
8 *of Rye*
10 *of Barly*
14 *of Oats*

4 *Anſw.*
B.
10 *of Rye*
14 *of Barly*
14 *of Oats*

5 *Anſw.*
B. *p.*
12 2 *of Rye*
5 0 *of Barly*
17 2 *of Oats*

6 *Anſw.*
B.
2 *of Rye*
14 *of Barly*
10 *of Oats*

7 *Anſw.*
B.
50 *of Rye*
70 *of Barly*
20 *of Oats*

2. A man being determined to mix 12 Buſhels of Oats, at 18*d. per* Buſhel, with Barly at 2*s.* 6*d.* with Rye at 3*s.* and with Wheat at 4*s. per* Buſhel; I demand how much Barly, Rye, and Wheat, muſt be mixed with the 12 Buſhels of Oats,

that it may bear the Price of 22 *d. per* Buſhel? *Anſw.* 1 *Buſhel of each ſort.*

3. A Man being determined to mix 12 Buſhels of Oats, at 18 *d. per* Buſhel, with Barly at 2 *s.* 6 *d.* with Rye at 3 *s.* and with Wheat at 4 *s. per* Buſhel; I demand how much Barly, Rye, and Wheat, muſt be mixed with the 12 Buſhels of Oats, that the Whole may bear the Price of 2 *s.* 9 *d. per* Buſhel?

1 *Anſw.* { *B*
60 *of Barly*
60 *of Rye*
12 *of Wheat*

2 *Anſw.* { *B.* *p.*
2 1 $\frac{9}{15}$ *of Barly*
2 1 $\frac{9}{15}$ *of Rye*
12 0 *of Wheat*

3 *Anſw.* { *B.*
10 *of Barly*
10 *of Rye*
12 *of Wheat*

4 *Anſw.* { *B.*
72 *of Barly*
72 *of Rye*
12 *of Wheat*

5 *Anſw.* { *B.*
2 *of Barly*
12 *of Rye*
10 *of Wheat*

6 *Anſw.* { *B.* *p.*
14 1 $\frac{9}{15}$ *of Barly*
2 1 $\frac{9}{15}$ *of Rye*
14 1 $\frac{9}{15}$ *of Wheat*

7 *Anſw.* 12 *Buſhels of each ſort.*

4. A Man being determined to mix 12 Buſhels of Oats, at 18 *d. per* Buſhel, with Barly at 2 *s.* 6 *d.* with Rye at 3 *s.* and with Wheat at 4 *s. per* Buſhel; I demand how much Barly, Rye, and Wheat, muſt be mixed with the 12 Buſhels of Oats, that the whole Quantity may bear the Price of 3 *s.* 6 *d. per* Buſhel?

Anſw. { *B.*
12 *of Barly*
12 *of Rye*
84 *of Wheat*

5. A Man intends to mix 28 Buſhels of Oats, at 18 *d. per* Buſhel, with Barly, at 2 *s.* 6 *d.* with Rye at 3 *s.* and with Wheat at 4 *s.* I would know how much Barly, Rye, and Wheat ought to be added to the 28 Buſhels of Oats, that the whole Quantity may be afforded at 2 *s. per* Buſhel? *Anſw.* 4 *Buſhels of each ſort.*

6. A Farmer would mix 27 Buſhels of Peaſe, at 18 *d. per* Buſhel, with Oats, at 28 *d.* and with Beans at 30 *d. per* Buſhel, that the whole Quantity may bear the Price of 20 *d. per* Buſhel, I demand how much Oats and Beans muſt be mixed with the 27 Buſhels of Peaſe? *Anſw.* 3 *Buſhels of each ſort.*

CASE

CASE 3.

Of Alternation Total.

Q. *What do you obſerve in this third* Caſe ?

A. When the *Rates* of the ſeveral *Things*, the *Quantity* to be compounded, and the *mean Rate* of the whole *Mixture* are given, to find how much of each ſort will make up the *Quantity*; place the *Difference* between the ſeveral *Prices*, and the *mean Rate*, alternately, as in *Caſe* 1. Then ſay,

As the *Sum* of the *Differences*
Is to the *whole Compoſition* :
So is the *Difference* of each *Rate*
To the *Quantity* of the ſame *Rate*.

EXAMPLES.

1. A Grocer hath 4 ſorts of Sugar, *viz.* at 8 *d. per lb.* at 6 *d. per lb.* at 4 *d. per lb.* and at 2 *d. per lb.* and he would have a Compoſition of an *C. wt.* worth 5 *d. per lb.* I demand how much of each Sort he muſt take ?

1 *Anſw.*

lb.	*d. p. lb.*
42	*at* 8
14	*at* 6
14	*at* 4
42	*at* 2
112	

2 *Anſw.*

lb.	*d. p. lb.*
14	*at* 8
42	*at* 6
42	*at* 4
14	*at* 2
112	

3 *Anſw.*

lb.	*oz.*	*dr.*	*d. p. lb.*
28	0	0	*at* 8
37	5	$5\frac{4}{12}$	*at* 6
9	5	$5\frac{4}{12}$	*at* 4
37	5	$5\frac{4}{12}$	*at* 2
112	0	0	

4 *Anſw.*

lb.	*oz.*	*dr.*	*d. p. lb.*
37	5	$5\frac{4}{12}$	*at* 8
9	5	$5\frac{4}{12}$	*at* 6
37	5	$5\frac{4}{12}$	*at* 4
28	0	0	*at* 2
112	0	0	

5 *Anſw.*

lb.	*oz*	*dr.*	*d. p. lb.*
11	3	$3\frac{2}{10}$	*at* 8
44	12	$12\frac{8}{10}$	*at* 6
44	12	$12\frac{8}{10}$	*at* 4
11	3	$3\frac{2}{10}$	*at* 2
112	0	0	

6 *Anſw.*

lb.	*d. p. lb.*
32	*at* 8
24	*at* 6
24	*at* 4
32	*at* 2
112	

7 *Anſw.* 28 *lb. of each ſort.*

2. A Vintner hath 4 ſorts of Wine, *viz.* Canary at 10*s.* *per* Gallon, Malaga at 8*s.* Rheniſh at 6*s.* and Oporto at 4*s.* and he is minded to make a Compoſition of 60 Gallons, worth 9*s.* *per* Gallon; I demand how much of each ſort he muſt have? *Anſw.* 45 *Gals. of Canary, and* 5 *Gals. of each other ſort.*

3. A Brewer hath 3 ſorts of Ale, *viz.* at 10*d.* at 8*d.* and at 6*d.* *per* Gallon; and he would have a Compoſition of 30 Gallons, worth 7*d.* *per* Gallon; I demand how much of each ſort he muſt have?

	Gals.		*d. per Gallon.*
	5	*at*	10
	5	*at*	8
Anſw.	20	*at*	6
	30		

4. A Goldſmith hath ſeveral ſorts of Gold, *viz.* ſome of 24 Carrats fine, ſome of 22 Carrats, and ſome of 18 Carrats fine; and he would have compounded of theſe ſorts the Quantity of 60*oz.* of 20 Carrats fine; I demand how much of each ſort he muſt take?

	Oz.			
	12	*at*	24	*Carrats fine*
	12	*at*	22	*Carrats fine*
Anſw.	36	*at*	18	*Carrats fine*
	60			

5. A Goldſmith hath Gold of three ſorts, *viz.* of 22 Carrats, of 21 Carrats, and of 20 Carrats fine, and he would mix with theſe ſo much Alloy, as that the Quantity of 21*oz.* may bear 18 Carrats fine; I demand how much of each ſort he muſt take and how much Alloy? *Anſw.* 6*oz.* *of each ſort of* Gold, *and* 3*oz.* *of* Alloy.

6. A Druggiſt had three ſorts of Drugs, one was worth 4*s.* *per lb.* another 5*s.* and another 8*s.* and out of theſe he made two Parcels, one was 21*lb.* at 6*s.* *per lb.* and the other 35*lb.* at 7*s.* *per lb.* how much of every ſort did he take for each Parcel?

	lb.		*s. per lb*	*lb.*		*s. per lb.*
	6	*at*	4	5	*at*	4
	6	*at*	5	5	*at*	5
Anſw.	9	*at*	8	25	*at*	8
	21	*at*	6*s. per lb.*	35	*at*	7*s. per lb.*

Of POSITION.

Q. WHAT *is* Poſition, *or* Negative Arithmetic?

A. It diſcovers the Truth by ſuppoſed Numbers.

Q. *How many kinds of* Poſition *are there?*

A. Two: *Single* and *Double.*

Of SINGLE POSITION.

Q. *What is* Single Poſition?

A. It diſcovers the Truth by only *one* ſuppoſed Number.

Q. *How is that* ſuppoſed Number *uſed?*

A. By working with it, as if it was the true Nnmber, in the ſame Proportion as the Queſtion directs; and if the Reſult be either too much, or too little, the true Number may be found out by the following Rule, *viz.*

As the *Reſult* of the *Poſition*
Is to the *Poſition*:
So is the given *Number*
To the *Number required.*

Q. *How do you prove* Poſition?

A. *Poſition*, both *Single* and *Double*, is proved by adding the ſeveral *Sums* required, or the ſeveral *Parts* of the *Sum* required together; and if that *Sum* agrees with the given *Sum*, it is right.

EXAMPLES.

1. Two Men, *A* and *B*, having found a Bag of Mony, diſputed who ſhould have it; *A* ſaid the half, third and fourth of the Mony, made 130 *l.* and if *B* could tell how much was in it, he ſhould have it all, otherwiſe he ſhould have nothing; I demand how much was in the Bag? *Anſw.* 120 *l.*

2. A, *B* and *C*, determining to buy together a certain Quantity of Timber, worth 36 *l.* agree that *B* ſhall pay $\frac{1}{3}$ more than *A*, and *C* $\frac{1}{4}$ more than *B*; I demand how much each Man muſt pay? *Anſw. A* 9 *l. B* 12 *l. C* 15 *l.*

3. A Perſon having about him a certain Number of Crowns, ſaid, if the half, third and fourth of them were added together, they would make 65 Crowns; I demand how many he had? *Anſw.* 60 *Crowns.*

4. *A* lent *B* a Sum of Mony, to be paid at 4 Payments; when 3 of them were made, and *A* came to demand the fourth, *B* would give him no more, except he would tell him how much was paid already; *A* ſaid the firſt Payment was a fourth; the ſecond, a fifth; and the third, a ſixth of the Sum firſt lent; and all together made 74 *l.* I demand the Sum lent? *Anſw.* 120 *l.*

5. One Man carrying a Bag of Mony in his Hand, another aſked him, How much was in it: He anſwered, he could not tell, but the third, fourth, and fifth of it made 94 *l.* how much was in the Bag? *Anſw.* 120 *l.*

6. I have delivered to a Banker a certain Sum of Mony, to receive of him after the Rate of 6 *l. per Cent. per Annum*; and at the End of ten Years, he paid me 500 *l.* for Principal and Intereſt together; I demand the Sum delivered to him at firſt? *Anſw.* 312 *l.* 10 *s.*

Of DOUBLE POSITION.

Q. *What is* Double Poſition?

A. It is that which diſcovers the true Number ſought, by making uſe of *two* ſuppoſed Numbers.

Q. *How are thoſe ſuppoſed Numbers uſed?*

A. 1. By working with them as if they were the true Numbers, in the ſame Proportion as the Queſtion directs.

2. The *Reſults* or *Errors* muſt be placed againſt their *Poſitions*, or ſuppoſed Numbers; thus,

Pos.	*Er.*
40	28
36	19

3. Multiply them *Croſs-wiſe*.

4. If the *Errors* are *alike*; *i. e.* both greater, or both leſs than the given Number, take their *Difference* for a *Diviſor*, and the *Difference* of the *Products* for a *Dividend*.

5. If the *Errors* are *unlike*, take their *Sum* for a *Diviſor*, and the *Sum* of the *Products* for a *Dividend*; the *Quotient* thence ariſing will be the *Anſwer*.

EXAMPLES.

1. *A*, *B*, and *C*, would divide 100 *l.* between them, ſo, as that *B* may have 3 *l.* more than *A*, and *C* 4 *l.* more than *B*; I demand how much each Man muſt have? *Anſw.* *A* 30 *l.* *B* 33 *l.* *C* 37 *l.*

2. A Man lying at the Point of Death, ſaid, He had in a certain Coffer 100 *l.* which he bequeathed to 3 of his Friends after this Manner; The firſt muſt have a certain Portion; the ſecond muſt have twice as much as the firſt, wanting 8 *l.* and the third muſt have three times as much as the firſt, wanting 15 *l.* I demand how much muſt each Man have? *Anſw. The Firſt* 20 *l.* 10 *s.* *Second* 33 *l.* *Third* 46 *l.* 10 *s.*

3. *A*, *B*, and *C* built an Houſe, which coſt 100 *l.* of which *A* paid a certain Sum; *B* paid 10 *l.* more than *A*; and *C* paid as much as *A* and *B*; I demand each Man's Share in that Charge? *Anſw.* *A paid* 20 *l.* *B* 30 *l.* *C* 50 *l.*

4. Three Perſons diſcourſed together concerning their Ages; ſays *A*, I am 20 Years of Age; ſays B, I am as old as *A*, and half *C*; and ſays *A*, I am as old as you both: I demand the Age of each Perſon? *Anſw. A was* 20, *B* 60, *C* 80 *Years of Age.*

5. A Man lying at the Point of Death, left to his 3 Sons all his Eſtate in Mony, *viz.* to *F* half wanting 50*l.* to *G* one third; and to *H* the reſt, which was 10 *l.* leſs than the Share of *G*; I demand the Sum left, and each Man's Part? *Anſw. The Sum left was* 360 *l. whereof F had* 130*l. G* 120*l. H* 110 *l.*

6. A certain Man having drove his Swine to the Market, *viz.* Hogs, Sows, and Pigs, received for them all 50 *l.* being paid for every Hog 18 *s.* for every Sow 16 *s.* for every Pig 2*s.* there were as many Hogs as Sows, and for every Sow there were three Pigs; I demand how many there were of each ſort? *Anſw.* 25 *Hogs,* 25 *Sows,* 75 *Pigs.*

7. A ſurly old Fellow being demanded the Ages of his four Children, anſwer'd, you may go and look: But if you muſt needs know; my firſt Son was born juſt one Year after I was married to his Mother, who, after his Birth, lived 5 Years, and then died in Child-bed with my ſecond Son: 4 Years after that I married again, and within 2 Years had my third and fourth Sons at a Birth; the Sum of whoſe two Ages is now equal to that of the eldeſt: I demand their ſeveral Ages? *Anſw. The firſt* Son *was* 22 *Years old, the ſecond* 17, *the third* 11, *and the fourth* 11 *Years old.*

Of COMPARATIVE ARITHMETIC.

Q. *WHAT is* Comparative Arithmetic?

A. It is ſuch, as anſwers Queſtions by Numbers, having *Relation* one to another.

Q. *Wherein does this Relation conſiſt?*

A. It conſiſts either in *Quantity* or *Quality.*

Q. *What is Relation of Numbers in* Quantity?

A. It is the *Reſpect* that one Number has to another.

Q. *How many are the Numbers propounded?*

A. They are always two, the *Antecedent* and the *Conſequent.*

Q. *In what does Relation of Numbers in* Quantity *conſiſt?*

A. It conſiſts in the *Difference,* or elſe in the *Rate* or *Reaſon* that is found between the Terms propounded.

Note, *The* Difference *of any two Numbers is the* Remainder; *but the* Rate or Reaſon *is the* Quotient *of the* Antecedent *divided by the* Conſequent.

Q. *What is Relation of Numbers in* Quality *or* Progreſſion?

A. Progreſſion or *Proportion* is the *Reſpect* that the Reaſon of Numbers have one to another.

Q. *How many muſt the Terms be?*

A. Three or *more*, but never *leſs:* Becauſe *leſs* than *three* will not admit of a Compariſon of *Reaſons* or *Differences*.

Of PROGRESSION.

Q. *How many kinds of* Progreſſion *are there?*

A. Two: *Arithmetical* and *Geometrical.*

Of ARITHMETICAL PROGRESSION.

Q. *What is* Arithmetical Progreſſion?

A. Arithmetical Progreſſion is when ſeveral Numbers have equal Differences; as 1, 2, 3, 4, differ by 1; or 2, 4, 6, 8, differ by 2.

Note 1, *If any Number of* Terms *differ by* Arithmetical Progreſſion, *the* Sum *of the two* Extreams *will be equal to the Sum of any two* Means *equally diſtant from the* Extreams. *As in* 2, 4, 6, 8; *where* $2+8$ *are* $=4+6=10$, *and ſo of any larger Number of* Terms.

2. *If the Number of* Terms *be odd, the middlemoſt ſupplies the Place of two* Terms. *As in* 1, 2, 3; *where* $1+3$ *are* $=2+2=4$.

CASE I.

Q. *What do you obſerve in this firſt* Caſe?

A. When the two *Extreams*, and the Number of *Terms* in any *Series* of Numbers in *Arithmetical Progreſſion* are given, and the Sum of all the Terms is required, then multiply the *Sum* of the two *Extreams* by half the Number of *Terms:* Or,

Multiply half the *Sum* of the *Extreams* by the whole Number of *Terms*, the *Product* is the Total of all the Terms.

EXAMPLES.

1. How many Strokes does the Hammer of a Clock ſtrike in 12 Hours? *Anſw.* 78.

2. A Merchant hath ſold 100 Yards of ſuperfine Cloth, *viz.* the firſt Yard for 1*s.* the ſecond for 2*s.* the third for 3*s.* &c. I demand how much he received for the ſaid Cloth? *Anſw.* 252*l.* 10*s.*

3. Bought 19 Yards of Shalloon, and gave 1*d.* for the firſt Yard, 3*d.* for the ſecond, 5*d.* for the third, &c. increaſing 2*d.* every Yard; I demand what I gave for the 19 Yards? *Anſw.* 1*l.* 10*s.* 1*d.*

4. A Mercer ſold 20 Yards of Silk, at 3*d.* for the firſt Yard, 6*d.* for the ſecond, 9*d.* for the third, &c. increaſing 3*d.* every Yard; I demand what he ſold the 20 Yards for? *Anſw.* 2*l.* 12*s.* 6*d.*

5. A Butcher bought 100 Head of Cattle, *viz.* Oxen, and gave for the firſt Ox 1 Crown, for the ſecond Ox 2 Crowns, for the third Ox 3 Crowns, &c. I demand what the Cattle coſt him? *Anſw.* 1262*l.* 10*s.*

6. Admit 100 Stones were laid 2 Yards diſtant from each other in a right Line, and a Baſket placed 2 Yards from the firſt Stone; I demand how many Miles a Man ſhall go in gathering them ſingly into the Baſket? *Anſw.* 11 *Miles*, 3 *Furlongs*, 180 *Yards*.

7. A Merchant ſold 1000 Yards of Linen at 2 Pins for the firſt Yard, 4 for the ſecond, 6 for the third, *&c.* increaſing 2 Pins, for every Yard; I demand how much the Linen produced, when the Pins were afterwards ſold at 12 for a Farthing? Alſo, whether the ſaid Merchant gained or loſt by the Sale thereof, and how much, ſuppoſing the ſaid Linen to have been bought at 6 *d.* *per* Yard?

Anſw.	*The Linen produced*	86*l.*	17*s.*	10*d.*
	The Merchant gained	61	17	10

CASE 2.

Q. *When the two* Extreams, *and the Number of* Terms *in any* Series *of Numbers in* Arithmetical Progreſſion *are given, and the* common Difference *of all the Terms in that* Series *are required, how is that* Difference *found?*

A. Divide the *Difference* between the two *Extreams*, by the Number of *Terms*, leſs *one*; the *Quotient* will be the *common Difference*.

EXAMPLES.

1. There are 21 Men, whoſe Ages are equally diſtant from each other in Arithmetical Progreſſion; the Youngeſt is 20 Years old, and the Eldeſt is 60; I demand the common Difference of their Ages, and the Age of each Man? *Anſw. The common Difference is two Years; therefore,*

Years.

60 *is the Age of the firſt Man.*

60 — 2 = 58 *is the Age of the Second.*

58 — 2 = 56 *is the Age of the Third.*

56 — 2 = 54 *is the Age of the Fourth*, &c.

2. A Debt is to be diſcharged at 16 ſeveral Payments in Arithmetical Proportion; the firſt Payment is to be 14*l.* the laſt 100*l* what is the whole Debt, and what muſt each Payment be? *Anſw. The whole Debt is* 912*l.* *The common Difference is* 5*l.* 14*s.* 8*d.* *therefore,*

14*l.* 0*s.* 0*d.* *1ſt Payment.*

14*l.* 0*s.* 0*d.* + 5*l.* 14*s.* 8*d.* = 19 14 8 *2d.*

19 14 8 + 5 14 8 = 25 9 4 *3d.*

25 9 4 + 5 14 8 = 31 4 0 *4th*, &c.

3. A Man

3. A Man is to travel from *York* to a certain Place in 12 Days, and to go but three Miles the firſt Day, increaſing every Day's Journey by an equal Exceſs, ſo that the laſt Day's Journey may be 36 Miles; what will each Day's Journey be, and how many Miles is the Place he goes to diſtant from *York?* *Anſw. The common Difference is* 3; *therefore,*

Miles.
3 *is the firſt Day's Journey.*
3 + 3 = 6 *is the Second.*
6 + 3 = 9 *is the Third.*
9 + 3 = 12 *is the Fourth,* &c.
The whole Diſtance is 234 *Miles.*

4. A running Footman, on a Wager, is to travel from *London* Northward, as follows: that is to ſay, he is to go 4 Miles the firſt Day; and 40 Miles the laſt Day; and to go the whole Journey in 10 Days, increaſing every Day's Journey by an equal Exceſs; I demand the Number of Miles he travelled each Day, and the Length of the whole Journey? *Anſw. The common Difference is* 4; *therefore,*

Miles.
4 *is the firſt Day's Journey.*
4 + 4 = 8 *is the Second.*
8 + 4 = 12 *is the Third,* &c.
The whole Journey is 220 *Miles.*

Of GEOMETRICAL PROGRESSION.

Q. *What is* Geometrical Progreſſion?

A. When any *Rank* or *Series* of Numbers *increaſes* by one *common Multiplier,* or *decreaſes* by one *common Diviſor,* thoſe Numbers are continued in *Geometrical Progreſſion*; as 3, 6, 12, 24, increaſe by the *Multiplier* 2; and 24, 12, 6, 3, decreaſe by the *Diviſor* 2.

Note 1. *If any Number of* Terms *be continued in* Geometrical Progreſſion, *the* Product *of the two* Extreams *will be equal to the* Product *of any two* Means *equally diſtant from the* Extreams; *as in* 3, 6, 12, 24; *where* 3 × 24, *are* = 6 × 12 = 72; *and ſo of any larger Number of* Terms.

2. *If the Number of* Terms *be odd, the Middlemoſt ſupplies the Place of two* Terms; *as in* 3, 6, 12; *where* 3 × 12 *are* = 6 × 6 = 36.

3. *The* common Multiplier, *and the* common Diviſor, *are called* Ratios.

Q. *How is the* Sum *of any* Series *in* Geometrical Progreſſion *obtained?*

A. 1. When all the *Terms* alone are given, then from the *Product* of the *ſecond* and *laſt Terms* ſubtract the *Square* of the *firſt Term*; that Remainder being divided by the *ſecond Term* leſs the *firſt*, will give the *Sum* of all the *Terms*.

2. When the two *Extreams* and the *Ratio* are only given, then multiply the laſt *Term* into the *Ratio*, and from that *Product* ſubtract the firſt *Term*; that *Remainder* divide by the *Ratio* leſs an *Unit* or 1, the *Quotient* is the *Sum* of all the *Terms*.

Note 1, *As the* laſt Term *in a long* Series *of Numbers is very tedious to come at by continual* Multiplication; *it would be neceſſary for the readier finding it out, to have a* Series *of Numbers in* Arithmetical Proportion, *called* Indices, *beginning with an* Unit, *whoſe common* Difference *is* One: *Alſo whatſoever Number of* Indices *you make choice of, let as many Numbers (in ſuch* Geometrical Proportion *as are given in the Queſtion) be placed under them*

$$\textit{Thus,}\ \begin{cases} 1,\ 2,\ 3,\ 4,\ 5,\ 6,\ 7 & \textit{Indices} \\ 2,\ 4,\ 8,\ 16,\ 32,\ 64,\ 128 & \textit{Numbers in Geometrical Proportion.} \end{cases}$$

2. *But if the* firſt Term *in* Geometrical Proportion *be different from the* Ratio, *the* Indices *muſt begin with a* Cypher.

$$\textit{Thus,}\ \begin{cases} 0,\ 1,\ 2,\ 3,\ 4,\ 5,\ 6 & \textit{Indices} \\ 1,\ 2,\ 4,\ 8,\ 16,\ 32,\ 64 & \textit{Numbers in Geometrical Proportion.} \end{cases}$$

3. *When the* Indices *begin with a* Cypher, *the Sum of the* Indices *made choice of, muſt always be* one *leſs than the Number of* Terms *given in the Queſtion; becauſe* 1 *in the* Indices *ſtands over the* ſecond Term, *and* 2 *in the* Indices *ſtands over the* third Term, *&c.*

4. *Add any two of theſe* Indices *together, and that* Sum *will directly correſpond with the* Product *of their reſpective* Terms.

5. *By the Help of theſe* Indices, *and a few of the firſt* Terms, *in any* Series *of* Geometrical Progreſſion, *any Term, whoſe Diſtance from the firſt Term is aſſigned, tho' it were never ſo far, may ſpeedily be obtained, without producing all the* Terms.

EXAMPLES.

1. A Man bought an Horſe, and by Agreement was to give a Farthing for the firſt Nail, two for the Second, four for the Third, *&c.* there were 4 Shoes, and 8 Nails in each Shoe: I demand what the Horſe was worth at that Rate? *Anſw.* 4473924*l.* 5*s.* 3*d.* 3*qrs.*

2. A Merchant ſold 15 Yards of Sattin, the firſt Yard for 1*s.* the ſecond for 2*s.* the third for 4*s.* the fourth for 8*s.* I demand the Price of the 15 Yards? *Anſw.* 1638*l.* 7*s.*

3. A Draper ſold 20 Yards of ſuperfine Cloth, the firſt Yard for 3*d.* the Second for 9*d.* the Third for 27*d.* *&c.* in triple Proportion Geometrical; I demand the Price of the Cloth? *Anſw.* 21792402*l.* 10*s.*

4. A Goldſmith ſold 1 *lb.* of Gold, at a Farthing for the firſt Ounce, a Penny for the Second, 4*d.* for the Third, *&c.* in quadruple Proportion Geometrical; I demand what he ſold the Whole for; alſo how much he gained by the Sale thereof, ſuppoſing he gave for it 4*l. per* Ounce?

Anſw. { *He ſold it for* 5825*l.* 8*s.* 5*d.* 1*qr.*
{ *And gained* 5777 8 5 1

5. A crafty Servant agreed with a Farmer (ignorant in Numbers) to ſerve him 12 Years, and to have nothing for his Service but the Produce of a Wheat-Corn for the firſt Year; and that Product to be ſowed for the ſecond Year; and ſo on from Year to Year, until the End of the ſaid Time; I demand the Worth of the whole Produce, ſuppoſing the Increaſe to be but in a tenfold Proportion, and ſold out at 4*s. per* Buſhel? *Anſw.* 4521112*l.* 4*s.* *rejecting Remainders.*

Note 1, 7680 *Wheat or Barly-Corns are ſuppoſed to make a Pint, and* 64 *Pints a Buſhel.*

2. *If the firſt* Term *in any* Series, *be either* greater *or* leſs *than the* Ratio, (except Unity) *then multiply any* two Terms *together, and their* Product *divide by the* firſt Term; *that* Quotient *will exactly correſpond with the* Sum *of their* Indices.

6. A Threſher worked 20 Days at a Farmer's, and received for the firſt Day's Work, 4 Barly-Corns; for the Second 12 Barly-Corns; for the third, 36 Barly-Corns; and ſo on in triple Proportion Geometrical; I demand what the 20 Days Labour came to, ſuppoſing the whole Quantity to be ſold for 2*s.* 6*d. per* Buſhel? *Anſw.* 1773*l.* 7*s.* 6*d.* *rejecting Remainders.*

7. A Merchant ſold 30 Yards of fine Velvet, trimmed with Gold very curiouſly, at 2 Pins for the firſt Yard, 6 Pins for the ſecond, 18 Pins for the third, *&c.* in triple Proportion Geometrical; I demand how much the Velvet produced, when the Pins were afterwards ſold at 100 for a Farthing; alſo, whether the ſaid Merchant gained or loſt by the Sale thereof, and how much, ſuppoſing the ſaid Velvet to have been bought at 50*l. per* Yard?

Anſw. { *The Velvet produced* 2144699292*l.* 13*s.* 0*d.* ½.
{ *The Merchant gained* 2144697792 13 0 ½.

Of PERMUTATION.

Q. W*HAT is* Permutation?

A. Changing the Order of Things.

Q. *How do you find all the* Variations, *any Number of* Things *is capable of going through?*

A. Multiply all the given *Terms* one into another continually; the laſt Product is the Number of *Changes* required.

EXAMPLES.

1. I demand how many Changes may be rung upon twelve Bells; and alſo how long they would be in ringing but once over, ſuppoſing 24 Changes might be rung in one Minute, and the Year to contain 365 Days, 6 Hours? *Anſw. The Number of Changes is* 479001600, and the Time is 37 *Years*, 49 *Weeks*, 2 *Days*, 18 *Hours.*

2. Seven Gentlemen that were travelling, met together by chance, at a certain Inn upon the Road, where they were ſo well pleaſed with their Hoſt, and each others Company, that in a Frolic, they offer'd him 30 *l.* to ſtay at that Place ſo long as they, together with him, could ſit every Day at Dinner in a different Order: The Hoſt thinking that they could not ſit in many different Poſitions, becauſe there were but a few of them, and that himſelf would make no conſiderable Alteration, he being but one, imagined that he ſhould make a good Bargain; and readily (for the ſake of a good Dinner and better Company) enter'd into an Agreement with them, and ſo made himſelf the eighth Perſon: I demand how long they ſtaid at the ſaid Inn, and how many different Poſitions they ſat in? *Anſw. The Number of Poſitions were* 40320; *and the Time that they ſtaid was* 110 *Years*, 142 *Days: allowing the Year to conſiſt of* 365 *Days*, 6 *Hours.*

Note, *There is one Thing in* Progreſſion, *and in* varying the Order of Things, *which is well worth our Obſervation*; *and that is The* Power of Numbers, *which is ſurpriſingly great, and beyond common Belief: and is no ways conceivable by a common Practitioner, hardly by a very good Artiſt; it being (in Appearance) not ſo much againſt* Reaſon *as above it. The firſt* Example *in* Geometrical Progreſſion, *diſcovers what a prodigious Sum of Mony a Horſe ſold after that manner would produce,* viz. *no leſs than* Four Millions four hundred ſeventy-three thouſand nine hundred and twenty-four Pounds; *whereas, if the ſame Horſe had been ſold at the ſame* Rate, *and but a fourth Part of the* Nails, *he would have brought to his Owner no more than* 5 *s.* 3 *d.* $\frac{3}{4}$. *The* ſecond Example *in* Permutation, *does likewiſe diſcover the Impoſſibility of the* Innkeeper's *performing his Promiſe; and in both, the Simplicity of two Men, who thinking they have got very good* Bargains, *do, inſtead thereof, find themſelves* ſevere Sufferers. *And altho' at the firſt Appearance, each* Queſtion *ſeems to produce but a meer Trifle; yet upon a* mature Conſideration, *there would not be found a Man in the Kingdom, able to purchaſe the* one, *or long-liv'd enough to ſtand to the Agreement with the* other. *Hence obſerve the great Poſſibility of a Man's being impos'd on in this way, by* Sharpers, *without a careful Examination into the Affair, before any Contract is made.*

THE

THE
Schoolmaſters Aſſiſtant.

PART II.

Of VULGAR FRACTIONS.

Of Fractions in general.

WHAT is a Fraction?

A. It is a broken Number; and ſignifies the Part or Parts of a whole Number.

Q. *How many kinds of* Fractions *are there?*

A. Two: *Vulgar* and *Decimal.*

Of NOTATION *of* VULGAR FRACTIONS.

Q. *What is a* Vulgar Fraction?

A. Any two Numbers placed thus $\frac{7}{8}$ make a *Vulgar Fraction.*

Q. *What is the upper Number of a* Fraction *called?*

A. It is called *Numerator*; and is the Remainder after Diviſion.

Q. *What is the lower Number called?*

A. It is called *Denominator*; and notes any Whole divided nto Parts; and is the Diviſor in Diviſion.

Q. *How many ſorts of* Vulgar Fractions *are there?*

A. Three: *Proper*, *Improper*, and *Compound.*

Q. *What is a* Proper Fraction?

A. When the *Numerator* is leſs than the *Denominator*, as $\frac{7}{8}$.

Q. *How far may a* Proper Fraction *be expreſs'd?*

A. Without end; as $\frac{1}{2}$ may be called $\frac{2}{4}$ or $\frac{3}{6}$ or $\frac{4}{8}$, *&c.* but e loweſt Term $\frac{1}{2}$ is always deſired.

Q. *What is an* Improper Fraction?

A. When the *Numerator* is greater than the *Denominator*, as $\frac{8}{7}$.

Q. *What is a* Compound Fraction?

A. It is the Fraction of a Fraction; as $\frac{1}{2}$ of $\frac{2}{3}$, *&c.*

f REDUCTION *of* VULGAR FRACTIONS.

CASE I.

HOW *are* Vulgar Fractions *reduced to a* common Denominator?

A. 1. Multiply each *Numerator* into all the *Denominators* but own, for a new *Numerator.*

2. Multiply all the *Denominators* for a *common Denominator.*

EXAMPLES.

1. Reduce $\frac{3}{6}$ and $\frac{5}{8}$ to a common Denominator. *Facit* $\frac{24}{48}$ and $\frac{30}{48}$

2. Reduce $\frac{7}{8}$, $\frac{9}{10}$ and $\frac{11}{12}$ to a common Denominator. *Facit* $\frac{840}{960}$, $\frac{864}{960}$ and $\frac{880}{960}$.

3. Reduce $\frac{6}{10}$, $\frac{4}{8}$, $\frac{1}{9}$ and $\frac{6}{7}$ to a common Denominator. *Facit* $\frac{3024}{5040}$, $\frac{2520}{5040}$, $\frac{560}{5040}$ and $\frac{4320}{5040}$.

4. Reduce $\frac{4}{9}$, $\frac{7}{11}$, $\frac{6}{7}$ and $\frac{1}{2}$ to a common Denominator. *Facit* $\frac{616}{1386}$, $\frac{882}{1386}$, $\frac{1188}{1386}$ and $\frac{693}{1386}$.

5. Reduce $\frac{6}{9}$, $\frac{2}{7}$, $\frac{1}{3}$ and $\frac{7}{8}$ to a common Denominator. *Facit* $\frac{1008}{1512}$, $\frac{432}{1512}$, $\frac{504}{1512}$ and $\frac{1323}{1512}$.

6. Reduce $\frac{4}{5}$, $\frac{1}{2}$, $\frac{5}{6}$ and $\frac{2}{8}$ to a common Denominator. *Facit* $\frac{384}{480}$, $\frac{240}{480}$, $\frac{400}{480}$ and $\frac{120}{480}$.

CASE 2.

Q. *How do you reduce a* Vulgar Fraction *to its loweſt* Terms

A. 1. Find a *common Meaſure* by dividing the lower *Term* by the upper; and that *Diviſor* by the *Remainder* following, til nothing remain: the laſt *Diviſor* is the *common Meaſure.*

2. Divide both Parts of the *Fraction* by the *common Meaſur* and the *Quotients* will make the *Fractions* required.

Note 1, *If the* common Meaſure *happens to be* 1, *the given* Fraction *already in its loweſt* Terms.

2. *When a* Fraction *hath* Cyphers *at the right Hand, it may be abbrevi by cutting them off*; *thus* $\frac{7|0}{9|0}$.

3. *This* Caſe *will prove* Caſe 1.

EXAMPLES.

1. Reduce $\frac{48}{56}$ to its loweſt Terms. *Facit* $\frac{6}{7}$.
2. Reduce $\frac{72}{94}$ to its loweſt Terms. *Facit* $\frac{36}{47}$.
3. Reduce $\frac{84}{170}$ to its loweſt Terms. *Facit* $\frac{42}{85}$.
4. Reduce $\frac{60}{125}$ to its loweſt Terms. *Facit* $\frac{12}{25}$.
5. Reduce $\frac{182}{196}$ to its loweſt Terms. *Facit* $\frac{13}{14}$.
6. Reduce $\frac{468}{1184}$ to its loweſt Terms. *Facit* $\frac{117}{296}$.

CASE 3.

Q. *What is a* mixt Number?

A. It is compoſed of a *whole Number* and a *Fraction*, thus 7

Q. *How is a* mixt Number *reduced to an* improper Fraction

A. 1. Multiply the *whole Number* into the *Denominator* the *Fraction.*

2. To the Product, add the *Numerator* for a new *Numerat*

3. Let its *Denominator*, be the *Denominator* given.

Note, *To expreſs a* whole Number *Fraction wiſe, put* 1 *for its* Denominat

EXA

EXAMPLES.

1. Reduce $12\frac{15}{17}$ to an improper Fraction. *Facit* $\frac{219}{17}$.
2. Reduce $19\frac{12}{18}$ to an improper Fraction. *Facit* $\frac{354}{18}$.
3. Reduce $16\frac{18}{100}$ to an improper Fraction. *Facit* $\frac{1618}{100}$.
4. Reduce $12\frac{19}{56}$ to an improper Fraction. *Facit* $\frac{691}{56}$.
5. Reduce $100\frac{19}{59}$ to an improper Fraction. *Facit* $\frac{5919}{59}$.
6. Reduce $79\frac{12}{19}$ to an improper Fraction. *Facit* $\frac{1513}{19}$.

CASE 4.

Q. *How is an* improper Fraction *reduced to its proper* Terms?

A. Divide the *upper Term* by the *lower.*

Note, *This* Caſe *and* Caſe 3 *prove each other.*

EXAMPLES.

1. Reduce $\frac{219}{17}$ to its proper Terms. *Facit* $12\frac{15}{17}$.
2. Reduce $\frac{141}{17}$ to its proper Terms. *Facit* $8\frac{5}{17}$.
3. Reduce $\frac{126}{48}$ to its proper Terms. *Facit* $2\frac{30}{48}$.
4. Reduce $\frac{961}{17}$ to its proper Terms. *Facit* $56\frac{9}{17}$.
5. Reduce $\frac{13}{7}$ to its proper Terms. *Facit* $1\frac{6}{7}$.
6. Reduce $\frac{24}{7}$ to its proper Terms. *Facit* $3\frac{3}{7}$.

CASE 5.

Q. *How do you reduce a* compound Fraction *to a* ſingle one?

A. 1. Multiply all the *Numerators* for a new *Numerator.*

2. Multiply all the *Denominators* for a new *Denominator.*

EXAMPLES.

1. Reduce $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$ to a ſingle Fraction. *Facit* $\frac{6}{24}$.
2. Reduce $\frac{7}{8}$ of $\frac{4}{6}$ of $\frac{9}{10}$ to a ſingle Fraction. *Facit* $\frac{252}{480}$.
3. Reduce $\frac{12}{14}$ of $\frac{5}{6}$ of $\frac{1}{2}$ to a ſingle Fraction. *Facit* $\frac{60}{168}$.
4. Reduce $\frac{5}{9}$ of $\frac{4}{8}$ of $\frac{3}{4}$ to a ſingle Fraction. *Facit* $\frac{60}{288}$.
5. Reduce $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{4}{5}$ to a ſingle Fraction. *Facit* $\frac{34}{60}$.
6. Reduce $\frac{1}{2}$ of $\frac{8}{9}$ of $\frac{6}{7}$ to a ſingle Fraction. *Facit* $\frac{48}{128}$.

CASE 6.

Q. *How do you reduce the* Fraction *of one* Denominator *to the* Fraction *of another, but greater, retaining the ſame Value?*

A. Reduce the given *Fraction* to a *compound Fraction*, by comparing it with all the *Denominations* between it, and that *Denomination*, which you would reduce it to.

2. Reduce that *compound Fraction* to a *ſingle* one, by Caſe 5.

EXAMPLES.

1. Reduce $\frac{5}{6}$ of a Penny to the Fraction of a Pound. *Facit* $\frac{5}{1440}$ *l.*

2. Reduce $\frac{1}{2}$ of a Farthing to the Fraction of a Shilling. *Facit* $\frac{1}{96}$ *s.*

3. Reduce $\frac{8}{9}$ of an Ounce Troy, to the Fraction of a Pound. *Facit* $\frac{8}{108}$ *lb.*

4. Reduce $\frac{6}{7}$ of a Pound Avoirdupois to the Fraction of a *C. wt.* *Facit* $\frac{6}{784}$ *C. wt.*

5. Reduce $\frac{9}{13}$ of a Pint of Wine to the Fraction of a *hhd.* *Facit* $\frac{9}{6552}$ *hhd.*

CASE 7.

Q. *How do you reduce the* Fraction *of one* Denomination *to the* Fraction *of another, but leſs, retaining the ſame Value?*

A. Multiply the given *Numerator*, by the Parts of the *Denominations*, between it, and that *Denomination* you would reduce the *Fraction* to, for a new *Numerator*, and place it over the given *Denominator*.

Note, *This* Caſe, *and* Caſe 6, *prove each other.*

EXAMPLES.

1. Reduce $\frac{5}{1440}$ of a Pound to the Fraction of a Penny. *Facit* $\frac{1200}{1440}=\frac{5}{6}$ *d.*

2. Reduce $\frac{1}{96}$ of a Shilling to the Fraction of a Farthing. *Facit* $\frac{1}{2}$ *qr.*

3. Reduce $\frac{8}{108}$ of a *lb.* Troy to the Fraction of an *Oz.* *Facit* $\frac{8}{9}$ *oz.*

4. Reduce $\frac{6}{784}$ of a *C. wt.* to the Fraction of a *lb.* *Facit* $\frac{6}{7}$ *lb.*

5. Reduce $\frac{9}{6552}$ of a *hhd.* of Wine to the Fraction of a Pint. *Facit* $\frac{9}{13}$ *Pint.*

CASE 8.

Q. *How do you reduce* Vulgar Fractions *from one* Denomination *to another of the ſame Value, having the* Numerator of the required Fraction given?

A. As the *Numerator* of the given *Fraction*
Is to its *Denominator*:
So is the *Numerator* of the intended *Fraction*
To its *Denominator*.

EXAMPLES.

1. Reduce $\frac{3}{4}$ to a Fraction of the ſame Value, whoſe Numerator ſhall be 15. *Facit* $\frac{15}{20}=\frac{3}{4}$.

2. Reduce $\frac{7}{8}$ to a Fraction of the ſame Value, whoſe Numerator ſhall be 42. *Facit* $\frac{42}{48}$.

3. Reduce $\frac{3}{4}$ to a Fraction of the ſame Value, whoſe Numerator ſhall be 34. *Facit* $\frac{34}{45}\frac{1}{3}$.

4. Reduce $\frac{5}{9}$ to a Fraction of the ſame Value, whoſe Numerator ſhall be 73. *Facit* $\frac{73}{131}\frac{2}{5}$.

Note, *From* Caſes 8 *and* 9, *there ariſes a new* Fraction; *which may not improperly be called a* mixt Fraction.

CASE.

CASE 9.

Q. *How do you reduce* Vulgar Fractions *from one* Denomination *to another of the ſame Value, having the* Denominator *of the* required Fraction *given?*

A. As the *Denominator* of the given *Fraction*
Is to its *Numerator:*
So is the *Denominator* of the intended *Fraction*
To its *Numerator.*

Note, *This* Caſe *and* Caſe 8, *prove each other.*

EXAMPLES.

1. Reduce $\frac{3}{4}$ to a Fraction of the ſame Value, whoſe Denominator ſhall be 20. *Facit* $\frac{15}{20}=\frac{3}{4}$.

2. Reduce $\frac{7}{8}$ to a Fraction of the ſame Value, whoſe Denominator ſhall be 49. *Facit* $\frac{42}{49}\,\frac{7}{8}$.

3. Reduce $\frac{3}{4}$ to a Fraction of the ſame Value, whoſe Denominator ſhall be 46. *Facit* $\frac{43}{46}\,\frac{2}{4}$.

4. Reduce $\frac{5}{9}$ to a Fraction of the ſame Value, whoſe Denominator ſhall be $131\frac{2}{5}$. *Facit* $\frac{73}{131}\,\frac{2}{5}$.

CASE 10.

Q. *How is a* mixt Fraction *reduc'd to a* ſingle *one?*

A. 1. When the *Numerator* is the *integral* Part: Then

(1.) Multiply it by the *Denominator* of the *fractional* Part, and to that *Product* add the *Numerator* of the *fractional* Part, for a new *Numerator.*

(2.) Multiply the *Denominator* of the *Fraction* by the *Denominator* of the *fractional* Part of the *Numerator*, for a new *Denominator.*

Note, *This proves* Caſe 9.

EXAMPLES

1. Reduce $\frac{42}{49}\,\frac{7}{8}$ to a ſimple Fraction. *Facit* $\frac{7}{8}$.
2. Reduce $\frac{34}{46}\,\frac{1}{2}$ to a ſimple Fraction. *Facit* $\frac{3}{4}$.
3. Reduce $\frac{17}{43}\,\frac{4}{9}$ to a ſimple Fraction. *Facit* $\frac{157}{387}$.

4. When the *Denominator* is the *integral* Part: Then

(1.) Multiply it by the *Denominator* of the *fractional* Part, and to that *Product* add the *Numerator* of the *fractional* Part, for a new *Denominator.*

(2.) Multiply the *Numerator* of the *Fraction* by the *Denominator* of the *fractional Part*, for a new *Numerator.*

Note, *This proves* Caſe 8.

EXAMPLES.

1. Reduce $\frac{73}{131}\,\frac{2}{5}$ to a ſimple Fraction. *Facit* $\frac{365}{657}=\frac{5}{9}$.
2. Reduce $\frac{41}{73}\,\frac{1}{4}$ to a ſimple Fraction. *Facit* $\frac{164}{293}$.
3. Reduce $\frac{7}{19}\,\frac{3}{5}$ to a ſimple Fraction. *Facit* $\frac{15}{98}=\frac{5}{14}$.

CASE II.

Q. *How do you find the* proper Quantity *of a* Fraction in the known Parts of an Integer?

A. Multiply the *Numerator* by the common Parts of the *Integer*, and divide by the *Denominator*.

EXAMPLES.

1. Reduce $\frac{2}{3}$ of a Pound Sterling to its proper Quantity. *Facit* 13*s.* 4*d.*

2. Reduce $\frac{18}{43}$ of a Shilling to its proper Quantity. *Facit* 5*d.* $\frac{1}{43}$.

3. Reduce $\frac{6}{7}$ of 5*l.* 9 . to its proper Quantity. *Facit* 4*l.* 13*s.* 5*d.* $\frac{1}{7}$.

4. Reduce $\frac{12}{16}$ of a *lb.* Troy to its proper Quantity. *Facit* 9 *oz.*

5. Reduce $\frac{12}{78}$ of a Ton Weight to its proper Quantity. *Facit* 3 *C.* 0 *qrs.* 8 *lb* 9 *oz.* 13 *dr.* $\frac{42}{78}$.

6. Reduce $\frac{5}{9}$ of a *lb.* Avoirdupois to its proper Quantity. *Facit* 8 *oz.* 14 *dr.* $\frac{2}{9}$.

7. Reduce $\frac{9}{11}$ of 10 *C.* 1 *qr.* 12 *lb.* to its proper Quantity. *Facit* 8 *C.* 1 *qr.* 25 *lb.* 1 *oz.* 7 *dr.* $\frac{3}{11}$.

8. Reduce $\frac{4}{7}$ of a Mile to its proper Quantity. *Facit* 4 *fur.* 125 *yds.* 2 *feet.* 1 *in.* 2 *bc.* $\frac{1}{7}$.

9. Reduce $\frac{9}{16}$ of a Yard to its proper Quantity. *Facit* 2 *feet,* 8 *in.* 1 *bc.* $\frac{2}{16}$.

10. Reduce $\frac{4}{5}$ of an Ell *Engliſh* to its proper Quantity. *Facit* 1 *Yard.*

11. Reduce $\frac{7}{16}$ of an Acre to its proper Quantity. *Facit* 1 *Rood,* 30 *Perches.*

12. Reduce $\frac{4}{9}$ of a Tun of Wine to its proper Quantity. *Facit* 1 *hhd.* 49 *galls.*

13. Reduce $\frac{7}{8}$ of a Barrel of Beer to its proper Quantity. *Facit* 30 *galls.* $\frac{1}{2}$.

14. Reduce $\frac{3}{8}$ of a Chaldron of Coals to its proper Quantity. *Facit* 13 *buſh.* $\frac{1}{2}$.

15. Reduce $\frac{2}{7}$ of a Quarter of Corn to its proper Quantity. *Facit* 2 *buſh.* 1 *peck* $\frac{1}{7}$.

16. Reduce $\frac{7}{13}$ of a Day natural to its proper Quantity. *Facit* 12 *hrs.* 55 *min* 23 *ſec.* $\frac{1}{13}$.

17. Reduce $\frac{4}{5}$ of a Month to its proper Quantity. *Facit* 3 *weeks,* 1 *day,* 9 *hrs.* 36 *min.*

18. What is the proper Quantity of $\frac{7}{8}$ of a Yard of Cloth? *Anſw* 3 *qrs.* 2 *na.*

19. What is the proper Quantity of $\frac{2}{9}$ of a *hhd.* of Beer? *Anſw.* 12 *galls.*

20. What is the proper Quantity of $\frac{3}{16}$ of a Barrel of Ale? *Anſw.* 6 *galls.*

CASE 12.

Q. *How do you reduce any given* Quantity *to the* Fraction *of any greater Denomination of the ſame Kind?*

A. 1. Reduce the given Quantity to the loweſt Term mentioned for a *Numerator*.

2. Reduce the *integral* Part to the ſame Term for a *Denominator*, and that will be the *Fraction* required.

Note 1, *If there be a* Fraction *given with the ſaid* Quantity, *let it be put to the* Numerator *of the* Fraction *required.*

2. Caſes 11 *and* 12 *prove each other.*

EXAMPLES.

1. Reduce 13 *s.* 4 *d.* to the Fraction of a Pound Sterling. *Facit* $\frac{160}{240}=\frac{2}{3}$ *l.*

2. Reduce 5 *d.* $\frac{1}{43}$ to the Fraction of a Shilling. *Facit* $\frac{18}{43}$ *s.*

3. What Part of 5 *l.* 9 *s.* is 4 *l.* 13 *s.* 5 *d.* $\frac{1}{7}$? *Anſw.* $\frac{6}{7}$.

4. Reduce 9 *oz.* Troy to the Fraction of a *lb.* *Facit* $\frac{6}{12}=\frac{3}{4}$ *lb.*

5. Reduce 3 *C.* 0 *qr.* 8 *lb.* 9 *oz.* 13 *dr.* $\frac{42}{78}$ to the Fraction of a Ton. *Facit* $\frac{12}{78}$ *Ton.*

6. Reduce 8 *oz.* 14 *dr.* $\frac{2}{9}$ to the Fraction of a *lb.* Avoirdupois. *Facit* $\frac{5}{9}$ *lb.*

7. What Part of 10 *C.* 1 *qr.* 12 *lb.* is 8 *C.* 1 *qr.* 25 *lb.* 1 *oz.* 7 *dr.* $\frac{3}{11}$? *Anſw.* $\frac{9}{11}$.

8. Reduce 4 *fur.* 125 *yds.* 2 *feet.* 1 *in.* 2 *bc.* $\frac{1}{7}$ to the Fraction of a Mile. *Facit* $\frac{4}{7}$ *Mile.*

9. Reduce 2 *feet,* 8 *in.* 1 *bc.* $\frac{2}{10}$ to the Fraction of a Yard. *Facit* $\frac{9}{10}$ *Yard.*

10. Reduce 1 Yard to the Fraction of an Ell. *Facit* $\frac{4}{5}$ *Ell.*

11. Reduce 1 *Rood,* 30 *Poles,* to the Fraction of an Acre. *Facit* $\frac{7}{16}$ *Acre*

12. Reduce 1 *hhd.* 49 *galls.* of Wine to the Fraction of a Tun. *Facit* $\frac{4}{9}$ *Tun.*

13. Reduce 31 *galls.* $\frac{1}{2}$ of Beer to the Fraction of a Barrel. *Facit* $\frac{7}{8}$ *Barrel.*

14. Reduce 13 *buſh.* $\frac{1}{2}$ of Coals to the Fraction of a Chaldron. *Facit* $\frac{3}{8}$ *Chaldron.*

15. Reduce 2 *buſh.* 1 *peck* $\frac{1}{7}$ of Corn to the Fraction of a Quarter. *Facit* $\frac{2}{7}$ *Quarter.*

16. Reduce 12 *hrs.* 55 *min.* 23 *ſec.* $\frac{1}{13}$ to the Fraction of a Day natural. *Facit* $\frac{7}{13}$ *Day.*

17. Reduce 3 *w.* 1 *d.* 9 *hrs.* 36 *min.* to the Fraction of a Month. *Facit* $\frac{4}{5}$ *Month.*

18. Reduce 3 *qrs.* 2 *na.* to the Fraction of a Yard. *Facit* $\frac{7}{8}$ *Yard.*

19. Reduce 12 *gals.* of Beer to the Fract. of a *Hhd. Facit* $\frac{4}{18}$ *hhd.*
20. Reduce 6 *gals.* of Ale to the Fract. of a *Bar. Facit* $\frac{3}{16}$ *bar.*
21. Reduce 13 *hrs.* 30 *min.* to the Fraction of a Day. *Facit* $\frac{810}{1440} = \frac{9}{16}$.

Of ADDITION *of* VULGAR FRACTIONS.

Q. HOW *are* Vulgar Fractions *added together?*

A. 1. Reduce the given *Fractions* to a common *Denominator.*

2. Add all the *Numerators* together for a new *Numerator*; under which ſubſcribe the common *Denominator.*

Note, *This* Rule *is proved by* Subtraction, *when two* Fractions *only are given.*

EXAMPLES.

1. Add $\frac{1}{2}$ and $\frac{7}{8}$ together. - - - - - - - - *Facit* $1\frac{6}{16}$.
2. Add $\frac{7}{10}$ and $\frac{11}{12}$ and $\frac{4}{9}$ together. - - - *Facit* $2\frac{66}{1080}$.
3. Add 19 and $7\frac{1}{2}$ of $\frac{2}{3}$ together. - - - - *Facit* $26\frac{2}{6}$.
4. Add $\frac{1}{2}$ of $\frac{7}{8}$ and $\frac{2}{3}$ of $\frac{19}{20}$ together. - - - *Facit* $1\frac{68}{960}$.
5. Add $\frac{1}{3}$ of 95 and $\frac{7}{8}$ of 14 together. - - *Facit* $43\frac{22}{24}$.
6. Add $\frac{2}{3}$ and $17\frac{1}{2}$ together. - - - - - - - *Facit* $18\frac{1}{6}$.
7. Add $12\frac{1}{2}$ and $3\frac{2}{3}$ and $4\frac{3}{4}$ together. - - *Facit* $20\frac{22}{24}$.
8. Add $6\frac{7}{8}$ of $\frac{9}{10}$ and $\frac{4}{7}$ of $\frac{1}{2}$ and $7\frac{1}{2}$ together. *Facit* $14\frac{1284}{2240}$.

Note, *In order to find the following* Facits, *the* Fractions *given muſt be reduced to their proper* Quantities *by* Caſe 11, *in* Reduction, *and then added, as in* Addition *of* whole Numbers.

9. Add $\frac{7}{8}$ of a Pound to $\frac{3}{4}$ of a Shilling. *Facit* 18 *s.* 3 *d.*
10. Add $\frac{1}{4}$ of a Penny to $\frac{1}{9}$ of a Pound. *Facit* 2*s.* 3*d.* 1 *qr.* $\frac{6}{9}$.
11. Add $\frac{1}{2}$ of a *lb.* Troy to $\frac{7}{12}$ of an *oz. Facit* 6 *oz.* 11 *dwts.* 16 *gr.*
12. Add $\frac{4}{7}$ of a Tun to $\frac{9}{10}$ of an *C. wt. Facit* 12 *C.* 1 *qr.* 8 *lb.* 12 *oz.* 12 *dr.* $\frac{8}{10}$.
13. Add $\frac{3}{4}$ of a Mile to $\frac{7}{10}$ of a Furlong. *Facit* 6 *Fur.* 28 *Poles.*
14. Add $\frac{1}{2}$ of a Yard to $\frac{2}{3}$ of a Foot. *Facit* 2 *feet,* 2 *in.*
15. Add $\frac{1}{3}$ of a Day to $\frac{1}{2}$ of an Hour. *Facit* 8 *hrs.* 30 *min.*
16. Add $\frac{4}{9}$ of a Chaldron to $\frac{7}{8}$ of a Buſh. *Facit* 16 *buſh.* 3 *pecks* $\frac{1}{2}$.
17. Add $\frac{1}{3}$ of a Week, $\frac{1}{4}$ of a Day, and $\frac{1}{2}$ of an Hour together. *Facit* 2 *days,* 14 *hrs.* $\frac{1}{2}$.
18. Add $\frac{2}{3}$ of a Yard, $\frac{3}{4}$ of a Foot, and $\frac{7}{8}$ of a Mile together. *Facit* 1540 *yds.* 2 *f.* 9 *in.*

Of SUBTRACTION *of* VULGAR FRACTIONS.

Q. HOW *are* Vulgar Fractions *ſubtracted?*

A. 1. Reduce the given *Fractions* to a common *Denominator.*

2. *Subtract* the leſſer *Numerator* from the greater, and place it over the common *Denominator.*

3. When the lower *Fraction* is greater than the upper, ſubtract the *Numerator* of the lower Fraction from the *Denominator,* and to that Difference add the upper *Numerator,* carrying *one* to the *Units* Place of the lower whole Number.

Note, *This* Rule *is proved by* Addition.

EXAMPLES.

1. From $\frac{111}{112}$ take $\frac{3}{4}$. - - - - *Facit* $\frac{108}{448}$.
2. From $\frac{97}{100}$ take $\frac{3}{7}$. - - - - *Facit* $\frac{379}{700}$.
3. From 96$\frac{1}{3}$ take 14$\frac{3}{7}$. - - - *Facit* 81$\frac{19}{21}$.
4. From 96 take $\frac{3}{5}$. - - - - *Facit* 95$\frac{2}{5}$.
5. From $\frac{1}{3}$ of 76 take $\frac{3}{4}$ of 21. *Facit* 9$\frac{7}{12}$.
6. From $\frac{109}{110}$ take $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$. *Facit* $\frac{1956}{2640}$.
7. From 71$\frac{1}{2}$ take $\frac{17}{19}$.- - - - *Facit* 70$\frac{23}{38}$.
8. From 14$\frac{1}{4}$ take $\frac{2}{3}$ of 19.- - *Facit* 1$\frac{7}{12}$.

Note, *In order to find the following* Facits, *the* Fractions *given muſt be reduced to their proper* Quantities *by* Caſe 11, *in* Reduction, *and then ſubtracted, as in* Subtraction *of* whole Numbers.

9. From $\frac{1}{2}$ of a Pound take $\frac{3}{4}$ of a Shilling. *Facit* 9*s.* 3*d.*
10. From $\frac{1}{2}$ of a Shilling take $\frac{3}{4}$ of a Penny. *Facit* 5*d.* $\frac{1}{4}$.
11. From $\frac{3}{5}$ of an *oz.* take $\frac{7}{8}$ of a *dwt.* *Facit* 11 *dwts.* 3*gr.*
12. From $\frac{1}{2}$ of an *C. wt.* take $\frac{7}{12}$ of a Pound. *Facit* 1 *qr.* 27 *lb.* 6 *oz.* 10 *dr.* $\frac{8}{12}$.
13. From $\frac{2}{3}$ of a League take $\frac{7}{10}$ of a Mile. *Facit* 1 *mile,* 2 *fur.* 16 *poles.*
14. From 1 Ell take $\frac{7}{10}$ of a *qr.* *Facit* 1 *yd.* 0 *qr.* 1 *na.* $\frac{2}{10}$.
15. From $\frac{3}{12}$ of a *hhd.* of Beer take 1 Gallon. *Facit* 12 *gall.* $\frac{1}{2}$.
16. From $\frac{4}{8}$ of a Chaldron take $\frac{2}{3}$ of a Buſhel. *Facit* 17 *buſh.* 1 *peck* $\frac{1}{3}$.
17. From 7 Weeks take 9 Days $\frac{7}{10}$. *Facit* 5 *wks.* 4 *days,* 7 *hrs.* 12 *min.*
18. From 4 *days* 7 *hrs.* $\frac{1}{2}$, take 1 *day* 9 *hrs.* $\frac{3}{18}$. *Facit* 2 *days* 22 *hrs.* $\frac{1}{3}$.

Of MULTIPLICATION *of* VULGAR FRACTIONS.

Q. HOW *are* Vulgar Fractions *multiplied?*

A. 1. Prepare the given Numbers (if need be) by the Rules of *Reduction.*

2. Multiply all the given *Numerators* for a new *Numerator,* and all the *Denominators* for a new *Denominator.*

Note, *When any* Number, *either* whole *or* mixt, *is multiplied by a* Fraction, *the* Product *is always* leſs *than the* Multiplicand, *in the ſame* Proportion *as the multiplying* Fraction *is* leſs *than* 1 *or an* Unit.

EXAMPLES.

EXAMPLES.

1. Multiply $\frac{3}{7}$ by $\frac{3}{11}$. - - - *Facit* $\frac{9}{77}$.
2. Multiply $\frac{4}{8}$ by $\frac{7}{9}$. - - - *Facit* $\frac{28}{72}$.
3. Multiply $\frac{1}{3}$ of $\frac{4}{5}$ by $\frac{7}{10}$ of $\frac{11}{12}$ - *Facit* $\frac{308}{1800}$.
4. Multiply $7\frac{1}{4}$ by $8\frac{1}{2}$. - - - *Facit* $61\frac{5}{8}$.
5. Multiply $4\frac{1}{2}$ by $\frac{1}{8}$. - - - - - *Facit* $\frac{9}{16}$.
6. Multiply $\frac{7}{8}$ by $13\frac{9}{10}$. - - *Facit* $12\frac{13}{80}$.
7. Multiply $\frac{1}{2}$ of 7 by $\frac{3}{6}$ - - - - *Facit* $1\frac{9}{12}$.
8. Multiply $\frac{3}{5}$ of 8 by $\frac{7}{8}$ of 5 - - *Facit* 21.
9. Multiply $\frac{3}{6}$ by $\frac{4}{9}$ of 11. - *Facit* $2\frac{24}{54}$.
10. Multiply $\frac{4}{5}$ of 91 by $71\frac{1}{2}$. - - - *Facit* $5205\frac{2}{10}$.
11. Multiply $12\frac{3}{5}$ by $\frac{2}{6}$ of 7. - - *Facit* $29\frac{12}{30}$.
12. Multiply $7\frac{1}{2}$ by $9\frac{1}{4}$. - - - *Facit* $69\frac{3}{8}$.

Of DIVISION *of* VULGAR FRACTIONS.

Q. HOW *are* Vulgar Fractions *divided?*

A. 1. Prepare the Numbers given (if need be) by the Rules of *Reduction*.

2. Multiply the *Denominator* of the *Diviſor* into the *Numerator* of the *Dividend*, for a new *Numerator*; and the *Numerator* of the *Diviſor* into the *Denominator* of the *Dividend*, for a new *Denominator*.

Note, 1. *When the* Dividend *is greater than the* Diviſor, *the* Quotient *will be greater than the* Dividend: *But when the* Dividend *is leſs than the* Diviſor, *then the* Quotient *will be leſs than the* Dividend, *and in the ſame Proportion as an* Unit *is greater or leſs than the dividing* Fraction.

2. Multiplication *and* Diviſion *prove each other.*

EXAMPLES.

1. Divide $\frac{17}{21}$ by $\frac{3}{5}$. - - *Facit* $1\frac{22}{63}$.
2. Divide $\frac{13}{19}$ by $\frac{7}{9}$. - - *Facit* $\frac{117}{138}$.
3. Divide $\frac{14}{18}$ by $\frac{7}{10}$. - - *Facit* $1\frac{14}{126}$.
4. Divide $1\frac{1}{2}$ by $4\frac{8}{10}$. - *Facit* $\frac{30}{96}$.
5. Divide $\frac{7}{8}$ by 4. - - *Facit* $\frac{7}{32}$.
6. Divide 4 by $\frac{7}{8}$. - - *Facit* $4\frac{4}{7}$.
7. Divide 99 by 108. - *Facit* $\frac{99}{108}$.
8. Divide $\frac{1}{5}$ of 19 by $\frac{2}{3}$ of $\frac{3}{4}$.- *Facit* $7\frac{18}{30}$.
9. Divide $\frac{1}{2}$ of $\frac{2}{3}$ by $\frac{2}{3}$ of $\frac{3}{4}$.- *Facit* $\frac{24}{36}$.
10. Divide $\frac{2}{3}$ of $\frac{3}{4}$ by $\frac{1}{2}$ of $\frac{2}{3}$.- *Facit* $1\frac{12}{24}$.
11. Divide $4\frac{5}{9}$ by $\frac{5}{9}$ of 4.- *Facit* $2\frac{1}{20}$.
12. Divide $\frac{5}{9}$ of 4 by $4\frac{5}{9}$. - - *Facit* $\frac{20}{41}$.

Of the SINGLE RULE *of* THREE DIRECT *in* VULGAR FRACTIONS.

Q. HOW *is the* Rule *of* Three *in* Fractions *perform'd?*

A. The Operation of the *Rule* of *Three* in *Fractions*, both *Single* and *Double*, *Vulgar* and *Decimal*, are exactly agreeable to the Principles laid down in the ſame Rules in whole Numbers.

Q. *How are the following Examples proved?*

A. By changing the Order of them.

EXAMPLES.

1. If $\frac{11}{13}$ *lb.* of Sugar coſt $\frac{7}{15}$ of a Shilling, what coſt $\frac{32}{43}$ *lb.*? *Anſw.* $\frac{2912}{7095}$ *s.* = 4 *d.* 3 *qrs.* $\frac{4971}{7095}$.

2. If $\frac{3}{5}$ Ell coſt $\frac{2}{3}$ *l.* what coſt $\frac{12}{17}$ Ell? *Anſw.* 15 *s.* 8 *d.* $\frac{30}{153}$.

3. If $\frac{4}{7}$ Ell coſt $\frac{7}{13}$ *l.* what coſt 1 Ell? *Anſw.* 18 *s.* 10 *d* $\frac{8}{52}$.

4. If 2 *oz.* of Silver coſt 16 *s.* 5 *d.* what coſt $\frac{3}{4}$ *oz.*? *Anſw.* 6 *s.* 1 *d.* 3 *qrs.* $\frac{1}{2}$.

5. If 6 Yards $\frac{1}{2}$ coſt 18 *s.* what coſt 9 Yards $\frac{1}{4}$? *Anſw.* 1 *l.* 5 *s.* 7 *d.* 1 *qr.* $\frac{28}{52}$.

6. If 1 Dollar be worth 56 *d.* $\frac{3}{5}$, what is 500 Dollars worth? *Anſw.* 117 *l.* 18 *s.* 4 *d.*

7. If 1 *yd.* $\frac{1}{4}$ coſt 9 *s.* what coſt 16 *yds.* $\frac{1}{4}$? *Anſw* 5 *l.* 17 *s.*

8. If 1 Piſtole be 17 *s.* $\frac{1}{5}$, what are 100 Piſtoles? *Anſw.* 86 *l.*

9. If $\frac{5}{7}$ *oz.* coſt $\frac{11}{12}$ *l.* what coſt 1 *oz.*? *Anſw.* 1 *l.* 5 *s.* 8 *d.*

10. If an Ingot of Silver weighs 16 *oz.* $\frac{11}{15}$, what is it worth at 5 *s.* 6 *d* *per oz.*? *Anſw.* 4 *l* 12 *s.* 0 *d.* 1 *qr.* $\frac{9}{15}$.

11. If $\frac{9}{10}$ *C.* coſt 14 *l.* 4 *s.* what will 7 *C.* $\frac{1}{2}$ coſt? *Anſw.* 118 *l.* 6 *s.* 8 *d.*

12. If $\frac{3}{5}$ of an Ell coſt $\frac{2}{3}$ of 19 *s.* what coſt 7 Ells? *Anſw.* 7 *l.* 7 *s.* 9 *d.* 1 *qr.* $\frac{3}{9}$.

13. If 8 *lb.* of Tobacco coſt 4 *s.* 9 *d.* $\frac{3}{5}$, what coſt 1 *lb.*? *Anſw.* 7 *d.* $\frac{1}{5}$.

14. If 1 *yd.* of broad Cloth coſt 15 *s.* $\frac{5}{8}$, what will 4 Pieces, each containing 27 *yds.* $\frac{3}{8}$ coſt? *Anſw.* 85 *l.* 10 *s.* 11 *d.* $\frac{1}{4}$.

15. A Mercer bought 3 Pieces $\frac{1}{2}$ of Silk, each containing 24 *Yards* $\frac{1}{3}$ at 6 *s.* 0 *d.* $\frac{1}{2}$ *per Yard*; I demand the Value of the 3 Pieces $\frac{1}{2}$, at that Rate? *Anſw* 25 *l.* 14 *s.* 6 *d.* 2 *qrs.* $\frac{4}{12}$.

16. If $\frac{1}{3}$ *lb.* leſs by $\frac{1}{6}$, coſt 13 *d.* $\frac{1}{5}$, what coſt 14 *lb.* leſs by $\frac{1}{5}$ of 2 *lb.*? *Anſw.* 4 *l.* 9 *s.* 9 *d.* $\frac{3}{25}$.

17. A Merchant had 5 *C.* $\frac{8}{9}$ of Sugar, at 6 *d.* $\frac{3}{4}$ *per lb.* which he would barter for Tea, at 8 *s.* $\frac{1}{8}$ *per lb.* I demand how much Tea muſt be given for the Sugar? *Anſw.* 43 *lb.* $\frac{6}{414}$.

18. Bought 120 *lb.* of Tea, at 8 *s.* $\frac{5}{8}$ *per lb.* and ſold it for 70 *l.* what was the Gain *per Cent.*? *Anſw.* 35 *l.* 5 *s.* 3 *d.* 3 *qrs.* $\frac{75}{1035}$.

Of the SINGLE RULE *of* THREE INVERSE *in* VULGAR FRACTIONS.

1. IF $3\frac{1}{4}$ Yards of Cloth that is 1 $\frac{1}{5}$ Yard wide, be ſufficient to make a Cloke; how much muſt I have of that ſort which is $\frac{4}{5}$ Yard wide to make a Cloke of the ſame Bigneſs? *Anſw.* 4 $\frac{7}{8}$ *Yards.*

2. If 16 Men finiſh a Piece of Work in $28\frac{1}{3}$ Days, how long will 12 Men require to do the ſame Work? *Anſw.* $37\frac{28}{36}$ *Days.*

3. If $1\frac{1}{4}$ Yard in Breadth require $20\frac{1}{2}$ Yards long to make a Garment; what Length will $\frac{3}{4}$ Yard wide require to make the ſame? *Anſw.* 34 $\frac{4}{24}$.

4. How many Pieces of Merchandize, at 20 *s.* $\frac{1}{8}$ *per* Piece, are to be given for 240 Pieces $\frac{1}{7}$, at 12 *s.* $\frac{1}{2}$ *per* Piece? *Anſw.* 149 $\frac{354}{2254}$ *Pieces.*

5. How many Yards of Canvas that is 1 Yard $\frac{1}{4}$ wide, will be ſufficient to line 20 Yards of Say, that is $\frac{3}{4}$ Yard wide? *Anſw.* 12 *Yards of Canvas.*

Of the DOUBLE RULE *of* THREE *in* VULGAR FRACTIONS.

1. IF 9 Students ſpend 10 *l.* $\frac{7}{9}$ in 18 Days; how much will 20 Students ſpend in 30 Days? *Anſw.* 39 *l.* 18 *s.* 4 *d.* $\frac{360}{1458}$.

2. Three Men having work'd 19 Days $\frac{1}{2}$, receiv'd 8 *l.* $\frac{9}{10}$; how much muſt 20 Men have for 100 Days $\frac{1}{4}$? *Anſw.* 305 *l.* 0 *s.* 8 *d.*+

3. A Man and his Wife having laboured 1 Day, earned 4 *s.* $\frac{5}{8}$; I demand how much they muſt have for 10 Days $\frac{1}{2}$, when their two Sons helped them? *Anſw.* 4 *l.* 17 *s.* 1 *d.* $\frac{1}{2}$.

4. A Man with his Family, which in all were 5 Perſons, did uſually drink 7 Gallons $\frac{4}{5}$ of Beer in a Week; how much will be drank in 22 Weeks $\frac{1}{7}$, when 3 Perſons more come into the Family? *Anſw.* 280 $\frac{40}{50}$ *galls.*

5. Seven Men with their Wives, upon examining into their Expenſes for 20 Weeks paſt, found that they had laid out 40 *l.* $\frac{4}{5}$. I demand in what Time 20 *l.* $\frac{3}{7}$ may be ſpent by 46 Men in the like Proportion? *Anſw.* 3 *weeks,* $\frac{3130}{65688}$.

6. Three Sailors having been abroad 9 Months $\frac{1}{4}$, received 40 *l.* $\frac{3}{15}$; I demand how much 100 Sailors muſt receive for 28 Months $\frac{3}{7}$ Service? *Anſw.* 4118 *l.* 6 *s.* 0 *d.* $\frac{1}{4}$.+

THE
Schoolmaſters Aſſiſtant.

PART III.

Of DECIMAL FRACTIONS.

Q. WHAT *do you underſtand by* Decimals *in general?*

A. Any Thing which is called *One*; as one *Foot*, one *Pound*, one *Shilling*, one *Year*, &c. is conceived in Imagination to be divided into *ten* equal *Parts*, and every one of thoſe Parts into *ten* other equal *Parts*; and ſo on, by a *Decimal* Diviſion, without End.

Q. *What is a* Decimal Fraction?

A. Any Number having a Point placed before it, thus .641 is a Decimal.

Q. *How do you diſtinguiſh a* whole Number *from a* Decimal Fraction?

A. Any Number having a Point placed after it, thus 641. is a whole *Number*.

Q. *What is a mixt* Number?

A. Any Quantity of Figures having a Point placed ſomewhere between them, thus 6.41, or thus 64.1, is a mixt *Number*.

Note, *The* Decimal Point *muſt never be omitted; becauſe without it a* Decimal *cannot be diſtinguiſhed from a* whole *or* mixt Number. *But when a* whole Number *alone is given, it is as common to omit it as to inſert it; as appears by ſeveral* Examples *following.*

Of NOTATION *of* DECIMALS.

Q. HOW *do* Decimal Places *increaſe?*

A. In the ſame manner as whole Numbers do; that is, by *Tens*: For every Place towards the left Hand is ten times greater than that which is next towards the right Hand, as appears by the following *Table*.

TABLE.

TABLE.

C. Thouſands	*X. Thouſands*	*Thouſands*	*Hundreds*	*Tens*	*Units*	*Tenth Parts*	*Hundredth Parts*	*Thouſandth Parts*	*X. Thouſandth Parts*	*C. Thouſandth Parts*
6	5	4	3	2	1.	2	3	4	5	6

Q. *May not* Cyphers *ſometimes be annexed to* Decimals?

A. They may; but they alter not their Value: Thus .41 and .4100 are the ſame.

Q. *May not* Cyphers *ſometimes be prefixed to* Decimal Parts?

A. Yes; and then they decreaſe their Value, by removing them farther from the Point; Thus .0041 is leſs than .41

Of ADDITION *and* SUBTRACTION *of* DECIMALS.

Q. HOW *are* Decimals *added or ſubtracted?*

A. Place the Numbers according to their Value; and work as in *Addition* and *Subtraction* of whole Numbers.

Q. *How are the Operations proved?*

A. As in whole Numbers.

EXAMPLES *in* ADDITION.

Shillings.	*Yds.*	*Galls.*	*£*
14.471	47.4	7004.16	71.001
1.191	19.71	712.712	120.07
1.8126	461.721	19.0174	31.121
3.6126	400.004	7.3126	13.4101
7.1281	7.1004	71.1851	76.04
18.8126	7.07	3.108	7.3

Miles.

Miles.	*lb.*	*Acres.*	*Ounces.*
41.8102	86.18104	.61271	48.9108
140.037	3.14	.8712	1.8191
18.10	1.181	.012	3.1080
7.8141	7.7121	.87	.7012
16.4612	8.19817	.04	.0012
7.81	13.071	.4	.0018

EXAMPLES *in* SUBTRACTION.

	Years.	*Days.*	*Weeks.*	*Hours.*
From	1081.761	712.10009	127.19	12.
Take	10.00012	7.121	121.	.12

	Minutes.	*Months.*	*Ells.*	*Tuns.*
From	174.1	6100.	.172618	761.8109
Take	1.471	6.109	.0000148	18.9112

Of MULTIPLICATION *of* DECIMALS.

Q. HOW *are* Decimals *multiplied?*
A. As whole Numbers are.

Note 1, *When Numbers are multiplied, make as many* Decimal Parts *in the* Product, *as there are in the two* Factors *taken together.*
2. *If* Decimal Places *are wanted in the* Product, *ſupply them with* Cyphers *to the* Decimal Point.
3. *Obſerve the ſame* Note *here, which is given in* Multiplication *of* Vulgar Fractions.

Q. *How are the following* Examples *proved?*
A. By inverting the *Factors.*

EXAMPLES.

EXAMPLES.

1. Multiply .612 by 4.12
2. Multiply 48. by .48
3. Multiply 37.9 by 46.5
4. Multiply .121 by 17.2
5. Multiply 1.81 by 71.
6. Multiply 4.1 by .142
7. Multiply .00071 by .121
8. Multiply .00041 by .00017
9. Multiply .0027 by 41.
10. Multiply 410. by .0012
11. Multiply .07 by .07
12. Multiply 1.007 by .041
13. Multiply 4.001 by .004
14. Multiply .004 by .004

Of DIVISION *of* DECIMALS.

Q. HOW *are* Decimals *divided?*
A. As whole Numbers are.

Note 1, *The* Decimal Places *of the* Diviſor *and* Quotient *muſt always be equal to thoſe in the* Dividend.

2. *If there be more* Decimals *in the* Diviſor *than in the* Dividend, *annex as many* Cyphers *as you pleaſe to the* Dividend, *ſo as to be equal at leaſt to the* Diviſor.

3. *If* Decimal Places *are wanting in the* Quotient, *they muſt be ſupplied with* Cyphers *to the* Decimal Point.

4. *Obſerve the ſame* Note *here, which is given in* Diviſion *of* Vulgar Fractions.

Q. *How are the following* Examples *to be proved?*
A. By *Multiplication.*

EXAMPLES.

1. Divide 19.4 by 37.5
2. Divide 47121.1 by 47.
3. Divide 4.18 by .1812
4. Divide .76121 by 41.
5. Divide .612812 by 7.21
6. Divide .121819 by .721
7. Divide 9. - - by .7121
8. Divide 9. - - by .9
9. Divide 14. - - by 47.31
10. Divide 1. - - by 863.
11. Divide .012181 by .12
12. Divide .0001212 by .018

Of REDUCTION *of* DECIMALS.

CASE I.

Q. HOW *do you reduce a* Vulgar Fraction *to a* Decimal?
A. Divide the *upper Term* by the *lower.*

Note 1, Both Terms *are to be eſteemed* whole Numbers.

2, *By this* Caſe Tables *containing the Decimal Parts of any Integer are conſtructed.*

EXAMPLES.

1. Reduce $\frac{5}{26}$ to a Decimal. - - - *Facit* .1923076+
2. Reduce $\frac{5}{28}$ to a Decimal. - - - *Facit* .1785714+

3. Reduce $\frac{11}{14}$ of $\frac{10}{13}$ to a Decimal. *Facit* .6043956+

4. Reduce 7*s.* 6*d.* to the Decimal of a Pound. *Facit* .375*l.*

5. Reduce 10*s.* 9*d.* $\frac{1}{4}$. to the Decimal of a Pound. *Facit* .5385416+*l.*

6. Reduce 24 Grains to the Decimal of a *lb.* Troy. *Facit* .0041666+*lb.*

7. Reduce 14 Drams to the Decimal of a *lb.* Avoirdupois. *Facit* .0546875 *lb.*

8. Reduce 4*C.* 2*qrs.* to the Decimal of a Ton. *Facit* .225 *Ton.*

9. Reduce 14*C.* to the Decimal of a Ton. *Facit* .7 *Ton.*

10. Reduce 174 Drams to the Decimal of an *C.* *Facit* .0060686+*C.*

11. Reduce 4 Inches to the Decimal of a Yard. *Facit* .1111111+*Yard.*

12. Reduce 76 Yards to the Decimal of a Mile. *Facit* .0431818+*Mile.*

13. Reduce 1 Mile to the Decimal of a League. *Facit* .33333333+*League.*

14. Reduce 3*qrs.* 2*na.* to the Decimal of a Yard. *Facit* .875 *yd.*

15. Reduce 4 Perches to the Decimal of an Acre. *Facit* .025 *Acre.*

16. Reduce 1 Pint to the Decimal of a Gallon. *Facit* .125 *galls.*

17. Reduce 1 Gallon of Wine to the Decimal of a *hhd.* *Facit* .015873+*hhd.*

18. Reduce 7 Minutes to the Decimal of a Day. *Facit* .0048611+*Day.*

19. Reduce 2 Days to the Decimal of a Week. *Facit* .2857142+*Week.*

20. Reduce 72 Days to the Decimal of a Year. *Facit* .1972602+*Year.*

CASE 2.

Q. *How do you find the proper* Quantity *of a* Decimal Fraction *in the known Parts of an* Integer?

A. Multiply it by the common Parts of the *Integer.*

Q. *How do you prove* Queſtions *in this* Caſe?

A. By *Caſe* 1.

EXAMPLES.

1. What is the proper Quantity of .76 of a Pound? *Anſw.* 15*s.* 2*d.* 1.6*qr.*

2. What is the proper Quantity of .861 of a *C. wt.* *Anſw.* 3*qrs.* 12*lb.* 6*oz.* 14.592*dr.*

3. What is the proper Quantity of .461 of a Shilling? *Anſw.* 5*d.* 2.128*qrs.*

4. What is the proper Quantity of .761 of a *hhd.* of Wine? *Anſw.* 47 *galls.* 3 *qts.* 1.544 *pt.*

5. What is the proper Quantity of .17 of a Tun of Wine? *Anſw.* 42 *galls.* 3.36 *qts.*

6. What is the proper Quantity of .761 of a Day? *Anſw.* 18 *hrs.* 15 *min.* 50.4 *ſec.*

7. What is the proper Quantity of .7 of a *lb.* of Silver? *Anſw.* 8 *oz.* 8 *dwts.*

8. What is the proper Quantity of .71 of 4 *oz.* of Gold? *Anſw.* 2 *oz.* 16 *dwts.* 19.2 *grs.*

9. What is the proper Quantity of .67 of a League? *Anſw.* 2 *miles,* 0 *fur.* 3 *poles,* 1 *yd.* 0 *feet,* 3 *in.* 1.8 *bc.*

10. What is the proper Quantity of .712 of a Furlong? *Anſw.* 28 *poles,* 2 *yds.* 1 *foot,* 11.04 *in.*

11. What is the proper Quantity of .07 of a Barrel of Ale? *Anſw.* 2 *galls.* 1.92 *pt.*

12. What is the proper Quantity of .4712 of an Ell *Engliſh*? *Anſw.* 2 *qrs.* 1.424 *na.*

13. What is the proper Quantity of .72 of a *hhd.* of Beer? *Anſw.* 38 *galls.* 3.52 *qts.*

14. What is the proper Quantity of .61 of a Tun of Wine? *Anſw.* 2 *hhds.* 27 *galls.* 2 *qts.* 1.76 *pt.*

15. What is the proper Quantity of .092 of 3 Acres, 2 Roods? *Anſw.* 1 *Rood,* 11.52 *Poles.*

16. What is the proper Quantity of .461 of a Chaldron of Coals? *Anſw.* 16 *buſh.* 2.384 *pecks.*

17. What is the proper Quantity of .712 of 3 *qrs.* of Corn? *Anſw.* 17 *buſh.* 2.816 *qts.*

18. What is the proper Quantity of .3 of a Year? *Anſw.* 109 *Days,* 12 *hrs.*

19. What is the proper Quantity of .5 of an Hour? *Anſw.* 30 *m.*

20. A certain Tenant hired an Houſe for 9 Years at 12.4 *l.* *per Annum*; how much was due at the End of the Term? *Anſw.* 111 *l.* 12 *s.*

Note 1. *To this* Caſe *is referred* Caſe 4, *in* Practice, p. 55.

EXAMPLES.

1286 *at* 4 *s.*

1ſt. 4 *s.* is = .2 *l.*

2d. 1286

.2

257.2

20

40

Facit 257 *l.* 4 *s.*

2. Addition *and* Subtraction *of* Decimals *of different Denominations, may eaſily be perform'd, after the* Decimals *are reduced to their* proper Quantities.

EXAMPLES.

1. What is the Sum of .48 *l.* and .16 *s.* reduced to their proper Quantities ? *Anſw.* 9 *s.* 9.12 *d.*

2. What is the Sum of .17 *lb.* Troy, and .84 *oz.*? *Anſw.* 2 *oz.* 17 *dwt.* 14.4 *gr.*

3. What is the Sum of .17 Ton, .19 *C.* .17 *qr.* and .7 *lb.*? *Anſw.* 3 *C.* 2 *qrs.* 15.54 *lb.*

4. What is the Difference between .17 *lb.* and .7 *s.*? *Anſw.* 2 *s.* 8 *d.* 1.6 *qr.*

5. What is the Difference between .41 Day and .16 Hour? *Anſw.* 9 *hrs.* 40 *min.* 48 *ſec.*

Of the SINGLE RULE *of* TRHEE DIRECT *in* DECIMALS.

Q. HOW *do you prove the following* Queſtions ?
A. By changing their Order.

EXAMPLES.

1. If 1.4 *lb.* of Mace coſt 14.5 *s.* what coſt 75.31 *lb.*? *Anſw.* 38 *l.* 19 *s.* 11 *d.* 3.52 *qrs.*

2. If 1.6 *C.* of Sugar coſt 3 *l.* 12.76 *s.* what coſt 3 *hhds.* each 11 *C.* 3 *qrs.* 10.12 *lb.*? *Anſw.* 80 *l.* 15 *s.* 3 *d.* 3.36 *qrs.*

3. If 1.5 *oz.* of Silver be worth 7.8 *s.* what is the Value of 9.7 *lb.*? *Anſw.* 30 *l.* 5 *s.* 3 *d.* 1.44 *qr.*

4. If 1.47 *C.* of Sugar be worth 4.5 *l.* what is 1.7 *lb.* worth at that Rate ? *Anſw.* 11.1 *d.*

5. If 1 Pint of Wine coſt 1.2 *s.* what coſt 12.5 *hhds.* *Anſw.* 378 *l.*

6. If 8.4 *lb.* of Tobacco coſt 16 *s.* 4.6 *d.* what coſt 3 *hhds.* each 4 *C.* 2 *qrs.* 7.4 *lb.*? *Anſw.* 149 *l.* 12 *s.* 3 *d.* 2 *qrs.*

7. If 1 Yard of Cloth coſt 12.3 *s.* what coſt 3 Pieces, each 21.5 Yards ? *Anſw.* 39 *l.* 13 *s.* 4.2 *d.*

8. A Man bought a Piece of Cloth for 6 *l.* 13.12 *s.* I demand how many Yards there were in the ſame, when he gave after the Rate of 4 *s.* 2.6 *d.* *per* Yard ? *Anſw.* 31.59 *Yards.*

9. A Man bought 5.8 Tuns of Oil for 60.4 *l.* but by Misfortune it chanced to leak out 50.9 Gallons ; I demand how he muſt ſell the reſt *per* Gallon to be no loſer ? *Anſw.* 10.27 *d. per Gallon.*

10. Two Men bartered, *A* had 40.7 *Yds.* of Linen, for which *B* gave him 25.6 Ells of Holland, at 4.5 *s. per* Ell; I demand the Price of the Linen *per* Yard? *Anſw.* 2 *s.* 9 *d.* 3.8 *qrs.*

11. A Grocer bought 7.6 *C.* of Sugar, at 40.1 *s. per C.* and ſold the ſame out at 4.5 *d. per lb.* I demand whether he gained or loſt, and how much? *Anſw.* 14 *s.* 5 *d.* 1.12 *qr. gain.*

12. A Brewer made a Quantity of Beer, which coſt him 90.4 *l.* and afterwards ſold it out at 26.7 *s. per* Barrel, by which he gain'd 10 *l.* I demand the Quantity that was brewed? *Anſw.* 75 *Bar.* 7.4+ *Gall.*

13. A Grocer bought 3 *C.* 1.5 *qr.* of Cloves, at the Rate of 2.75 *s. per lb.* and ſold them for 60 *l.* 11 *s.* 6 *d.* what did he gain or loſe by the Bargain? *Anſw. He gain'd* 8 *l.* 12 *s.*

14. A Merchant bought 436 Yards of Cloth for 8.5 *s. per* Yard, and ſold it again for 10.75 *s. per* Yard; what did he gain by the Sale thereof? *Anſw.* 49 *l.* 1 *s. gain.*

15. *A* owes *B* 296.85 *l.* but he compounds for 7.5 *s.* in the Pound; what muſt *B* receive for his Debt? *Anſw.* 111 *l.* 6 *s.* 4 *d.* 2 *qrs.*

16. Bought 3 *hhds.* of Tobacco, each weighing 4 *C.* 1.9 *qr.* at 5.6 *l. per C.* which I ſold out at 7 *l.* 16 *s. per C.* what did I gain by the Whole? *Anſw.* 29 *l.* 10 *s.* 8 *d.* 1.6 *qr.*

17. A Jeweller bought a Diamond for 60 Guineas, which weighed 1.5 *oz.* and after it was neatly cut, he ſold it again for 3.25 *s. per* Grain; I demand how much he gain'd by the ſaid Diamond; and alſo at what Rate *per Cent.* he made his Gain?

Anſw. { *Whole Gain* – 54 *l.* 0 *s.* 0 *d.* 0 *qr.*
Gain per Cent. 85 14 3 1.7+

Of CONVERGI

OR

Extracting the ROOTS

A TABLE *of*

Roots, - - - - - - or Firſt Powers - -	1	2	3	4	
Squares, - - - - - - or Second Powers -	1	4	9	16	
Cubes, - - - - - - or Third Powers -	1	8	27	64	
Biquadrates, - - - - - or Fourth Powers -	1	16	81	256	
Surſolids, - - - - - - or Fifth Powers - -	1	32	243	1024	
Square-Cubes, - - - - or Sixth Powers - -	1	64	729	4096	
Second Surſolids, - - - or Seventh Powers -	1	128	2187	16384	
Biquadrates ſquared, - - or Eighth Powers -	1	256	6561	65536	
Cubes cubed, - - - - - or Ninth Powers -	1	512	19683	262144	
Surſolids ſquared, - - - or Tenth Powers -	1	1024	59049	1048576	
Third Surſolids, - - - or Eleventh Powers -	1	2048	177147	4194304	4
Square-Cubes ſquared, - or Twelfth Powers -	1	4096	531441	16777216	2
Fourth Surſolids, - - - or Thirteenth Powers	1	8192	1594323	67108864	12
Second Surſolids ſquared, or Fourteenth Powers	1	16384	4782969	268435456	61
Surſolids cubed, - - - or Fifteenth Powers -	1	32768	14348907	1073741824	305

Let this fold again

15 APR 60

GING SERIES;

OR,

OTS *of all* POWERS.

E *of* POWERS.

4	5	6	7	8	9
16	25	36	49	64	81
64	125	216	343	512	729
256	625	1296	2401	4096	6561
1024	3125	7776	16807	32768	59049
4096	15625	46656	117649	262144	531441
16384	78125	279936	823543	2097152	4782969
65536	390625	1679616	5764801	16777216	43046721
262144	1953125	10077696	40353607	134217728	387420489
1048576	9765625	60466176	282475249	1073741824	3486784401
4194304	48828125	362797056	1977326743	8589934592	31381059609
16777216	244140625	2176782336	13841287201	68719476736	282429536481
67108864	1220703125	13060694016	96889010407	549755813888	2541865828329
68435456	6103515625	78364164096	678223072849	4398046511104	22876792454961
73741824	30517578125	470184984576	4747561509943	35184372088832	20589113209464

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9

81

729

561

049

441

2969

6721

0489

4401

5960

3648

2832

5496

9464

Of the SQUARE-ROOT.

Q. WHAT *is a* Square?

A. Any Number multiplied by itſelf produces a *Square.*

Q. *What is the* Extraction *of the* Square-Root?

A. If a *Square* be given to find one Side, it is called the *Extraction* of the *Square-Root.*

Q. *How is the given* Square *to be prepared for* Extraction?

A. By pointing off at every two Figures, from the *Units Place*, both ways for a *Reſolvend.*

Q. *What is a* Surd?

A. It is an imperfect *Square*, or ſuch a Number, whoſe Square-Root can never exactly be found.

EXAMPLES.

1. What is the Square of 17.1? – *Anſw.* 292.41.
2. What is the Square of .09? – *Anſw.* .0081.
3. What is the Square of .0094? *Anſw.* .00008836.
4. What is the Square-Root of 4712.81261? *Anſw.* 68.649+
5. What is the Square-Root of 9712.718051? *Anſw.* 98.553+
6. What is the Square-Root of 3.1721812? *Anſw.* 1.78106+
7. What is the Square-Root of 1.3976121? *Anſw.* 1.1822+
8. What is the Square-Root of 761.801216? *Anſw.* 27.6007+
9. What is the Square-Root of .00076120816? *Anſw.* .02759+
10. What is the Square-Root of 4.000067121? *Anſw.* 2.000016+

11. There is an Army conſiſting of a certain Number of Men, who are placed Rank and File, that is, in the Form of Square, each Side having 472 Men; I demand how many Men the whole Square contains? *Anſw.* 222784 *Men.*

12. The Floor of a certain great Room is made exactly Square, each Side of which contains 75 Feet; I demand how any Square Feet are contained therein? *Anſw.* 5625 *Feet.*

13. Suppoſe 12544 Soldiers are to be put into Rank and ile, in the Form of an equal Square; I demand how many oldiers will be in the Front, and how many deep? *Anſw.* 112.

14. A certain Square Pavement contains 197136 Square tones, all of the ſame Size; I demand how many are contained one of its Sides? *Anſw.* 444.

15. The Wall of a Town is 17 Feet high, which is ſurrounded by a Mote of 20 Feet in breadth; I demand the length of a Ladder which ſhall reach from the Outſide of the Mote to the Top of the Wall? *Anſw.* 26.2+ *Feet.*

Of the SQUARE-ROOT *of a* VULGAR FRACTION.

Q. *How is the* Square-Root *of a* Vulgar Fraction *extracted?*

A. 1. Reduce the *Fraction* to its loweſt Term.

2. Extract the *Square-Root* of the Numerator for a new *Numerator*, and the *Square-Root* of the Denominator for a new *Denominator*.

3. If the *Fraction* be a *Surd*, reduce it to a *Decimal*, and then extract the *Square-Root* from it.

4. The *Decimal Fraction* muſt conſiſt of an even Number of Places, as *two*, *four*, &c.

EXAMPLES.

1. What is the Square-Root of $\frac{3044}{6849}$? *Anſw.* $\frac{2}{3}$.
2. What is the Square-Root of $\frac{3456}{5400}$? *Anſw.* $\frac{4}{5}$.
3. What is the Square-Root of $\frac{7050}{9216}$? *Anſw.* $\frac{7}{8}$.

SURDS.

4. What is the Square-Root of $\frac{3168}{6192}$? *Anſw.* .71528+
5. What is the Square-Root of $\frac{208}{272}$? *Anſw.* .87447+
6. What is the Square-Root of $\frac{387}{738}$? *Anſw.* .72414+

Of the SQUARE-ROOT *of a* MIXT NUMBER.

Q. *How is the* Square-Root *of a* mixt Number *extracted?*

A 1. Reduce the *fractional* Part of the mixt Number to its loweſt Term.

2. Reduce the *mixt Number* to an improper *Fraction*.

3. Extract the *Roots* of the Numerator and Denominator, for a new *Numerator* and *Denominator*.

4. If the mixt Number given, be a *Surd*, reduce the *fractional Part* to a *Decimal*, and annex it to the whole Number, and extract the *Square-Root* from the Whole.

EXAMPLES.

1. What is the Square-Root of $37\frac{36}{49}$? *Anſw* $6\frac{1}{7}$.
2. What is the Square-Root of $17\frac{16}{25}$? *Anſw.* $4\frac{1}{5}$.
3. What is the Square-Root of $5\frac{288}{648}$? *Anſw.* $2\frac{1}{3}$.

SURDS.

4. What is the Square-Root of $76\frac{14}{17}$? *Anſw.* 8.7649+
5. What is the Square-Root of $7\frac{9}{14}$? *Anſw.* 2.7961+

Of the CUBE-ROOT.

Q. W*HAT is a* Cube?

A. Any Number multiplied by its *Square* produces a *Cube.*

Q. *What is the Extraction of the* Cube-Root?

A. If a *Cube* be given to find out a Number, which being multiplied into its *Square*, produceth the Number given; this is called the Extraction of the *Cube-Root.*

Q. *How is the given* Cube *to be prepared for Extraction?*

A. by pointing off at every three Figures, both Ways, from the *Units Place*, for a *Reſolvend.*

Q. *What is a* Surd?

A. It is an *imperfect Cube*, or ſuch a Number, whoſe *Cube-Root* can never be exactly found.

Q. *What is the Rule for extracting the* Cube-Root *of a Number?*

A. This: The firſt Figure ſought is the *Root* of the greateſt *Cube* contained in the firſt Member, and it is called a; then $3aa+3a$ is the *Diviſor*, which finds a new Figure called e; then $3aae+3eea+eee$ is the *Subtrahend* or Number to be ſubducted; which *Operation* is to be continued to every *Reſolvend.*

Note, *This* Rule *being ſomewhat dark, I ſhall, by way of Illuſtration, ſubjoin the* Operation, *at large, for extracting the* Cube-Root *of any Number.*

What is the Cube-Root of 444194·947?

(1) *Let the given* Number *be pointed as before directed*;

thus $\dot{4}44\dot{1}94\cdot94\dot{7}$

(2) *The firſt* Member, *which contains the greateſt* Cube *is* 444; *and the neareſt* Root, *whoſe* Cube *is not greater than it, is* 7, *which ſet*

thus $\dot{4}44\dot{1}94\cdot94\dot{7}$(7

(3) *The* Cube *of* 7 *is* 343, *which ſet down and ſubtract, annexing the next three Figures or Member,* viz. 194 *for a* Reſolvend;

thus $\dot{4}44\dot{1}94\cdot94\dot{7}$(7
343

101194 *Reſolvend.*

(4) *The Number* 7, *in the* Root, *is called* a; *then by the* Rule, $3aa + 3a$ *is the* Diviſor; *thus,*

$$\begin{array}{rl}
7 &= a \\
7 &= a \\ \hline
49 &= aa \\
3 & \\ \hline
147 &= 3aa \\
21 &= 3a \\ \hline
\textit{Diviſor}\ 1491 &= 3aa + 3a
\end{array}
\qquad
\begin{array}{l}
\dot{4}44\dot{1}94.\dot{9}47(7 \\
343 \\ \hline
1491)101194\ \textit{Reſolvend}
\end{array}$$

(5) *The next Figure in the* Root, *viz.* 6 *(found by common Diviſion) is called* e; *then by the* Rule $3aae + 3eea + eee$, *is the* Subtrahend, *or Number to be ſubducted*; *thus,*

$$\begin{array}{rl}
147 &= 3aa \\
6 &= e \\ \hline
882 &= 3aae \\
756 &= 3eea \\
216 &= eee \\ \hline
\textit{Sub.}\ 95976 &= 3aae + 3eea + eee
\end{array}
\qquad
eee \text{ viz. } 6 = 216
\qquad
\begin{array}{rl}
6 &= e \\
6 &= e \\ \hline
36 &= ee \\
3 & \\ \hline
108 &= 3ee \\
7 &= a \\ \hline
756 &= 3eea
\end{array}$$

$$\begin{array}{rl}
& \dot{4}44\dot{1}94.\dot{9}47(76. \\
& 343 \\ \hline
1491) & 101194\ \textit{Reſolvend} \\
& 95976\ \textit{Subtrahend} \\ \hline
& 5218\ 947\ \textit{Reſolvend}
\end{array}$$

(6) *When the next* Member *is brought down,* viz. 947 *as before, both* Figures *in the* Root, *viz.* 76 *muſt be called* a; *then to find a Diviſor to this laſt* Reſolvend, *ſay as before,* $3aa + 3a$; *thus,*

$$\begin{array}{rl}
76 &= a \\
76 &= a \\ \hline
456 & \\
532 & \\ \hline
5776 &= aa \\
3 & \\ \hline
17328 &= 3aa \\
228 &= 3a \\ \hline
\textit{Diviſor}\ 173508 &= 3aa + 3a
\end{array}
\qquad
\begin{array}{rl}
76 &= a \\
3 & \\ \hline
228 &= 3a
\end{array}
\qquad
\begin{array}{rl}
& \dot{4}44\dot{1}94.\dot{9}47(76. \\
& 343 \\ \hline
1491) & 101194\ \textit{Reſolvend} \\
& 95976\ \textit{Subtrahend} \\ \hline
173508) & 5218\ 947\ \textit{Reſolvend}
\end{array}$$

(7) *The next Figure in the* Root, *viz.* 3, *found as before, is alſo called* e; *then again* 3aae + 3eea + eee *is the other* Subtrahend, *or Number to be ſubducted; thus,*

17328 = 3*aa*
3 = *e*
51984 = 3*aae*
2052 = 3*eea*
27 = *eee*
Sub. 5218947 = 3*aae* + 3*eea* + *eee*

eee viz. 3 = 27

3 = *e*
3 = *e*
9 = *ee*
3
27 = 3*ee*
76 = *a*
162
189
2052 = 3*eea*

444194.947(76.3 *Anſwer*
343
1491)101194 *Reſolvend*
95976 *Subtrahend*
173508)5218 947 *Reſolvend*
5218 947 *Subtrahend*
0

EXAMPLES.

1. What is the Cube of 6 4?	*Anſw.* 262.144
2. What is the Cube of .13?	*Anſw.* .002197
3. What is the Cube of 41.1?	*Anſw.* 69426.531
4. What is the Cube of .09?	*Anſw.* .000729
5. What is the Cube of .007?	*Anſw.* .000000343
6. What is the Cube-Root of 7612.812161? - - - - - -	*Anſw.* 19 67+
7. What is the Cube-Root of 7612181.7612? - - - - - -	*Anſw.* 196.71+
8. What is the Cube-Root of 61218.00121? - - - - - -	*Anſw.* 39.41+
9. What is the Cube-Root of 7121.1021698? - - - -	*Anſw.* 19.238+
10. What is the Cube-Root of 12000.812161? - - - - - -	*Anſw.* 22.89+
11. What is the Cube-Root of .121861281? - - - - - - -	*Anſw.* .495+
12. What is the Cube-Root of .0069761218? - - - - - -	*Anſw.* .19107+

13. If a cubical Piece of Timber be 41 Inches long, 41 Inches broad, and 41 Inches deep; how many cubical Inches doth it contain? *Anſw.* 68921 *cubical Inches.*

14. Suppoſe a Cellar to be dug that ſhall be 12 Feet every way in length breadth, and depth; how many ſolid Feet of Earth muſt be taken out to compleat the ſame? *Anſw.* 1728.

15. Suppoſe a Stone of a cubic Form to contain 474552 ſolid Inches; what is the ſuperficial Content of one of its Sides? *Anſw.* 6084 *Inches.*

Of the CUBE-ROOT *of a* VULGAR FRACTION.

Q. *How do you extract the* Cube-Root *of a Vulgar Fraction?*

A. 1. Reduce the *Fraction to its loweſt Terms.*

2. Extract the *Cube-Roots* of the Numerator and Denominator for a new *Numerator* and *Denominator.*

3. If the *Fraction* be a *Surd,* reduce it to a *Decimal,* and then extract the *Cube-Root* from it.

4. The *Decimal Fraction* muſt conſiſt of Ternaries of Places; as *three, ſix, nine,* &c.

EXAMPLES.

1. What is the Cube-Root of $\frac{352}{1188}$? *Anſw.* $\frac{2}{3}$.
2. What is the Cube-Root of $\frac{1944}{4608}$? *Anſw.* $\frac{3}{4}$.
3. What is the Cube-Root of $\frac{648}{3000}$? *Anſw.* $\frac{3}{5}$.

SURDS.

4. What is the Cube-Root of $\frac{4}{9}$? *Anſw.* .763+
5. What is the Cube-Root of $\frac{6}{7}$? *Anſw.* .949+
6. What is the Cube-Root of $\frac{1}{3}$? *Anſw.* .693+

Of the CUBE-ROOT *of a* MIXT NUMBER.

Q. *How do you extract the* Cube-Root *of a* mixt Number?

A. 1. Reduce the *fractional* Part to its loweſt Terms.

2. Reduce the *mixt Number* to an improper *Fraction.*

3. Extract the *Cube-Roots* of the Numerator and Denominator, for a new *Numerator* and *Denominator.*

4. If the mixt Number given be a *Surd,* reduce the fractional Part to a *Decimal,* and annex it to the whole Number, and extract the *Cube-Root* from the Whole.

EXAMPLES.

1. What is the Cube-Root of $578\frac{19}{27}$? *Anſw.* $8\frac{1}{3}$.
2. What is the Cube-Root of $42\frac{21}{24}$? *Anſw.* $3\frac{1}{2}$.
3. What is the Cube-Root of $5\frac{104}{125}$? *Anſw.* $1\frac{4}{5}$.

SURDS.

4. What is the Cube-Root of $8\frac{2}{12}$? *Anſw.* 2.013+
5. What is the Cube-Root of $7\frac{3}{5}$? *Anſw.* 1.966+

Of the BIQUADRATE-ROOT.

Q. WHAT *is a* Biquadrate *Number?*

A. Any Number involved *four Times* produces a *Biquadrate.*

Q. *How is the* Biquadrate-Root *extracted?*

A. Firſt extract the *Square-Root* of the given *Reſolvend*; and then extract the *Square-Root* of that *Square-Root*, for the *Biquadrate-Root* required.

EXAMPLES.

1. What is the Biquadrate of 48? *Anſw.* 5308416.
2. What is the Biquadrate of 96? *Anſw.* 84934656.
3. What is the Biquadrate-Root of 5308416? *Anſw.* 48.
4. What is the Biquadrate-Root of 84934656? *Anſw.* 96.
5. What is the Biquadrate Root of 21743271936? - - - - - - - } *Anſw.* 384.

Of the SURSOLID-ROOT.

Q. WHAT *is a* Surſolid?

A. Any Number involved *five Times,* produces a *Surſolid.*

Q. *How is the* Surſolid-Root, *or the* Root *of any other higher* Power *extracted?*

A. By the following *general Rules.*

1. If any even *Power* be given, let the *Square-Root* of it be extracted, which reduces it to half of the given Power, then the *Square-Root* of that Power reduces it to half of the ſame Power; and ſo on till you come to a *Square* or a *Cube.*

For *Example:* Suppoſe a 24*th* Power be given; the *Square-Root* of that reduces it to a 12*th* Power; the *Square-Root* of the 12*th* Power reduces it to a 6*th* Power; and the *Square-Root* of the 6*th* Power to a *Cube.*

2. If any odd *Power* be given, as the 17*th*, &c. obſerve,

(1) From the *Unity Place,* both ways, point off at every ſuch Number of Figures as is the *Index* of the Power for a *Reſolvend.*

(2) Seek in the Table of *Powers,* for ſuch a Power (being the ſame Power with the *Index.)* as comes neareſt the firſt *Period,* whether greater or leſs, calling its *Root* accordingly *more than juſt,* or *leſs than juſt.*

(3) Annex ſo many *Cyphers* to the *Root,* as there are *Periods* of whole Numbers in the given *Reſolvend.*

(4) Find the *Difference* between the given *Reſolvend,* and the *Power* coming neareſt the firſt *Period.*

(5) Whatever odd *Power* is given, the next loweſt odd *Power* to that of the ſaid *Root* muſt be found, with its annexed *Cyphers*; *i. e.* if the 9th *Power* be given, find the 7th *Power* of the *Root* and *Cyphers*; if the 11th *Power* be given, find the 9th, *&c.*

(6) Multiply that next loweſt odd *Power* by the *Index* of the given *Power,* and let that Product be a *Diviſor* to the *Difference* between the given *Reſolvend* and *Power* firſt found, which depreſſes it to a *Square.*

(7) Point this *Square* into *Periods* of two Figures each.

(8) Then make the firſt *Root* without its *Cyphers* a *Diviſor,* and aſk how oft it may be found in the firſt *Period* of the *Square.*

(9) If the *Diviſor* be *leſs than juſt,* you muſt multiply the *Quotient Figure* by half the *Index,* i. e. if the *Index* be 11, multiply the *Quotient Figure* by 5; if the *Index* be 9, multiply it by 4, *&c.* and add it to the *Diviſor*; but if it be *more than juſt,* you muſt ſubtract it from the *Diviſor,* having a *Cypher* annexed or ſuppoſed to be annexed to the *Diviſor*; which *Sum* or *Difference* muſt be multiplied by the ſaid *Quotient Figure,* and ſo continued to every new Figure in the *Quotient.*

(10) If the firſt *Root* with its *Cyphers* be *more than juſt,* the *Quotient* muſt be ſubtracted from it; but if it be *leſs than juſt,* it muſt be added to it; and the *Sum* or *Difference* will be the *Root* required.

3. If an even *Power* be given, and the *Square-Root* of that *Power* being extracted, reduces it to an odd *Power*: you muſt then proceed with that odd *Power* as the foregoing *Rules* direct.

EXAMPLES.

1. What is the Surſolid of 6436343.?

6436343

32 *the neareſt* Surſolid, *whoſe* Root *and* Cypher *is* 20

3236343

The Cube *of* 20 *is* = 8000

And 8000 × 5 *is* = 40000

Then 40000)3236343(80 *Laſtly* 20

Again 2)80(3 + 3

+ 3 × 2 = 6 78

1ſt.*Diviſor*=26 — 23 *the Surſolid-Root required.*

·2 *to be rejected.*

Note, *This a very expeditious Way of extracting the* Roots *of* high Powers, *but it is not always exact, becauſe (as Mr.* Ward *obſerves, for it was taken from him) there will be a* Remainder, *and ſometimes an* Exceſs *or* Defect *in the laſt* Figure *of the* Root, *when the given* Reſolvend *or* Power *hath a true* Root; *as appears by the* fifth Example *following, whoſe true* Root *ſhould not be* 384.3 *as it there ſtands, but* 384.

2. What is the Surſolid of 48? *Anſw.* 254803968.
3. What is the Surſolid-Root of 8153726976? *Anſw.* 96.
4. What is the Surſolid-Root of 254803968.? *Anſw.* 48.
5. What is the Surſolid-Root of 8349416423424.? - - - - - - - *Anſw.* 384.3

Of the SQUARE-CUBE-ROOT.

Q. WHAT *is a* Square-Cube?

A. Any Number involved *ſix Times*, produces a *Square-Cube.*

EXAMPLES.

1. What is the Square-Cube of 48.? - - - - - - - - - - - - - - *Anſw.* 12230590464.
2. What is the Square-Cube-Root of 782757789696.? - - - - - - - *Anſw.* 96.
3. What is the Square-Cube-Root of 12230590464.? - - - - - - - - *Anſw.* 48.
4. What is the Square-Cube-Root of 3206175906594816.? - - - - *Anſw.* 384.

Of the SECOND SURSOLID-ROOT.

Q. WHAT *is the* Second Surſolid?

A. Any Number involved *ſeven Times* produces a *ſecond Surſolid.*

EXAMPLES.

1. What is the ſecond Surſolid of 96.? - - - - - - - - *Anſw.* 75144747810816.
2. What is the ſecond Surſolid-Root of 75144747810816.? - - - - - - - - - *Anſw.* 96.
3. What is the ſecond Surſolid-Root of 587068342272.? - - - - - - - - - - *Anſw.* 48.
4. What is the ſecond Surſolid-Root of 1231171548132409344.? - - - - - - - *Anſw.* 384.42.

Of the SQUARE-BIQUADRATE-ROOT.

Q. WHAT *is a* Square-Biquadrate?

A. Any Number involved *eight Times*, is a *Biquadrate Squared.*

EXAMPLES.

1. What is the Squared Biquadrate of 48.? - - - *Anſw.* 28179280429056

2. What is the Square-Biquadrate-Root of 7213895789838336.? - - - - - - - - *Anſw.* 96.

3. What is the Square-Biquadrate-Root of 28179280429056.? - - - - - - - - - *Anſw.* 48.

4. What is the Square-Biquadrate-Root of 472769874482845188096.? - - - - *Anſw.* 384.

Of the CUBED CUBE-ROOT.

Q. W*HAT is a* Cubed Cube?

A. Any Number involved *nine Times*, is a *Cubed Cube.*

EXAMPLES.

1. What is the Cubed Cube-Root of 6925339958244480256.? - - - - - - - *Anſw.* 96.2

2. What is the Cubed Cube-Root of 13526054605946688.? - - - - - - - - *Anſw.* 48.09

3. What is the Cubed Cube-Root of 1815436318014125522228864.? - - - *Anſw.* 384.5

Of the SQUARE-SURSOLID-ROOT.

Q. W*HAT is a* Squared Surſolid?

A. Any Number involved *ten Times*, produces a *ſquared Surſolid.*

EXAMPLES.

1. What is the Squared Surſolid-Root of 64925062108545024.? - - - - - - - - - - *Anſw.* 48.

2. What is the Squared Surſolid-Root of 66483263599150104576.? - - - - - - - *Anſw.* 96.

3. What is the Squared Surſolid-Root of 697127546117424200558837 76.? - - - *Anſw.* 384.3

Of the THIRD SURSOLID-ROOT.

Q. W*HAT is a* Third Surſolid?

A. Any Number involved *eleven Times*, produces a *third Surſolid.*

EXAMPLES.

1. What is the third Surſolid-Root of 952809757913927.? - - - - - - - - - - - *Anſw.* 23.

2. What is the third Surſolid-Root of 3116402981210161152.? - - - - - - - - *Anſw.* 48.

3. What is the third Surſolid-Root of 6382393305518410039296.? - - - - - *Anſw.* 96.

Of

Of the SQUARED SQUARE-CUBE-ROOT.

Q. WHAT *is a* Squared Square-Cube?

A. Any Number involved *twelve Times*, produces a *Squared Square-Cube.*

EXAMPLES.

1. What is the Root of this Squared Square-Cube 149587343098087735296.? - - - - - -	*Anſw.* 48.
2. What is the Root of this Squared Square-Cube 612709757329767363772416.? - - - -	*Anſw.* 96.
3. What is the Root of this Squared Square-Cube 10279563944029090291760398073856?	*Anſw* 384.

A general Rule *for extracting the* ROOTS *of all* Powers.

1. PRepare the given Number for *Extraction*, by pointing off from the *Unity Place*, as the *Root* required directs.

2. Find the firſt Figure in the *Root* by your own Judgment, or by Inſpection into the *Table* of *Powers.*

3. Subtract it from the *given Number.*

4. Augment the *Remainder* by the next Figure in the given Number, that is, by the firſt Figure in the next Point, and call this your *Dividend.*

5. Involve the *whole Root*, laſt found, into the next inferior *Power* to that which is given.

6. Multiply it by the *Index* of the *given Power*, and call this your *Diviſor.*

7. Find a Quotient Figure by common Diviſion, and annex it to the *Root.*

8. Involve all the *Root*, thus found, into the given *Power.*

9. Subtract this *Power* (always) from as many Points of the given *Power* as you have brought down, beginning at the loweſt Place.

10. To the *Remainder* bring down the firſt Figure of the next Point for a new *Dividend.*

11. Find a new *Diviſor* as before, and in like manner proceed till the Work is ended.

EXAMPLES.

What is the Cube-Root of 115501303. ?

115501303.(487
64

48)515 *Dividend.*

110592 *Subtrahend.*

6912)49093 *Dividend.*

115501303 *Subtrahend.*

0

4 × 4 × 3 = 48 *Diviſor.*
48 × 48 × 48 = 110592 *Subtrahend.*
48 × 48 × 3 = 6912 *Diviſor.*
487 × 487 × 487 = 115501303 *Subtrahend.*

2. What is the Biquadrate-Root of 56249134561. ?

56249134561.(487
256

256)3064 *Dividend.*

5308416 *Subtrahend.*

442368)3164974 *Dividend.*

56249134561 *Subtrahend.*

0

4 × 4 × 4 × 4 = 256 *Diviſor.*
48 × 48 × 48 × 48 = 5308416 *Subtrahend.*
48 × 48 × 48 × 4 = 442368 *Diviſor.*
487 × 487 × 487 × 487 = 56249134561 *Subtrahend.*

Note, *This* General Rule *I received from my worthy Friend Mr.* William Mountaine, *F. R. S. and Teacher of the Mathematics at* Shad-Thames.

Of SIMPLE INTEREST.

Q. WHAT *particular* Letters *are uſed here?*

A. Theſe; *P.* any *Principal.*
T. the *Time.*
R. the *Ratio* of the Rate *per Cent.*
A. the *Amount.*

Q. *What is the* Ratio?

A It ſignifies only the *Simple Intereſt* of 1 *l.* for one Year, at any propoſed Rate of Intereſt *per Cent.* and is thus found;

l. *l.* *l.*
100 : 6 :: 1 : 0.06
100 : 5 :: 1 : 0.05, *&c.*

A TABLE *of* RATIOS.

Rate per Ct.	*Ratio.*	*Rate per Ct.*	*Ratio.*
2	.02	$6\frac{1}{2}$	.065
3	.03	7	.07
$3\frac{1}{2}$	.035	$7\frac{1}{2}$	.075
4	.04	8	.08
$4\frac{1}{2}$	.045	$8\frac{1}{2}$	.085
5	.05	9	.09
$5\frac{1}{2}$	.055	$9\frac{1}{2}$	.095
6	.06	10	.1

CASE I.

Q. *When* P, T, *and* R, *are given to find* A; *how is it diſcovered?*

A. Thus, $ptr + p = a$.

Note, *Any Quantity of* Letters *put together like a Word, denote continual Multiplication.*

EXAMPLES.

1. What Sum will 567 *l.* 10 *s.* amount to in 9 Years, at 6 *per Cent. per Ann.?* *Anſw.* 873 *l.* 19 *s.*

2. What will 508 *l.* 14 *s.* amount to in 1 Year, at 5 *per Cent. per Ann?* *Anſw.* 534 *l.* 2 *s.* 8 *d.* 1.6 *qr.*

3. What will 600 *l.* 14 *s.* amount to in 10 Years, at $4\frac{1}{2}$ *per Cent. per Ann.?* *Anſw.* 871 *l.* 0 *s.* 3 *d.* 2.4 *qrs.*

4. What will 4000 *l.* amount to in 5 Years, at $3\frac{1}{2}$ *per Cent. per Ann.?* *Anſw.* 4700 *l.*

Note, *When the* Time *given, does not conſiſt of whole* Years, *then reduce the odd* Time *into Decimal Parts of a* Year. *And, unleſs ſuch Parts of a* Year *chance to be juſt* $\frac{1}{4}$, $\frac{1}{2}$, *or* $\frac{3}{4}$ *of a* Year, *the beſt Way will be to reduce the odd* Time *into* Days, *and then work with the Decimal Parts of a* Year, *that are equivalent to thoſe* Days.

A TABLE *for the ready finding the Decimal Parts of a* Year *equal to any Number of* Days, *or* Quarters *of a* Year.

Days.	*Decimal Pts.*	*Days.*	*Decimal Pts.*	*Days.*	*Decimal Pts.*
1	.00274	10	.027397	100	.273973
2	.005479	20	.054794	200	.547945
3	.008219	30	.082192	300	.821918
4	.010959	40	.109589	365	1.000000
5	.013699	50	.136986		
6	.016438	60	.164383		
7	.019178	70	.191781	¼ *of a Year*	.25
8	.021918	80	.219178	½ *of a Year*	.5
9	.024657	90	.246575	¾ *of a Year*	.75

Note, *When the true Number of* Days *cannot be found at one View in this* Table, *then both them and their* Decimals *muſt be taken out of the* Table *at* twice *or* thrice, *as their Number requires, and added together. So the Decimal Parts of a* Year = 236 Days, *are thus found,*

200 = .547945
30 = .082192
6 = .016438
236 = .646575

EXAMPLES.

5. What will 7200*l.* amount to in 6½ Years at 5 *per Cent. per Ann.?* *Anſw.* 9540*l.*

6. What will 1110*l.* 18*s.* amount to in 12¾ Years at 5 *per Cent. per Ann.?* *Anſw.* 1819*l.* 1*s.* 11*d.* 2.8*qrs.*

7. What will 280*l.* 10*s.* amount to in 3 Years and 148 Days at 5 *per Cent. per Ann.?* *Anſw.* 328*l.* 5*s.* 2*d.* 3.38+*qrs.*

8. What will 196*l.* amount to in 189 Days at 4 *per Cent. per Ann.?* *Anſw.* 200*l.* 1*s.* 2*d.* 1.23+*qr.*

CASE 2.

Q. *When* A, T, *and* R, *are given to find* P; *how is it diſcovered?*

A. Thus; $\frac{a}{tr+1}=p.$

EXAMPLES.

1. I demand what Principal will amount to 873*l.* 19*s.* in 9 Years at 6 *per Cent. per Ann.?* *Anſw.* 567*l.* 10*s.*

2. I demand what Principal will amount to 534*l.* 2*s.* 8*d.* 1.6*qr.* in 1 Year at 5 *per Cent. per Ann.?* *Anſw.* 508*l.* 14*s*

3. I demand what principal will amount to 9540*l.* in 6½ Years at 5 *per Cent. per Ann.?* *Anſw.* 7200*l.*

4. I demand what Principal will amount to 1819*l.* 1*s.* 11*d.* 2.8*qrs.* in 12¾ Years at 5 *per Cent. per Ann.?* *Anſw.* 1110*l.* 18*s.*

5. I demand what Principal will amount to 871 *l.* 0 *s.* 3 *d.* 2.4 *qrs.* in 10 Years at $4\frac{1}{2}$ *per Cent. per Ann.?* *Anſw.* 600 *l.* 14 *s.*

6. I demand what Principal will amount to 4700 *l.* in 5 Years at $3\frac{1}{2}$ *per Cent. per Ann.?* *Anſw.* 4000 *l.*

7. I demand what Principal will amount to 328 *l.* 5 *s.* 2 *d.* 3.38 *qrs.* in 3 Years and 148 Days at 5 *per Cent.?* *Anſw.* 280 *l.* 10 *s.*

8. What Principal being put to Intereſt for 189 Days at 4 *per Cent.* will amount to 200 *l.* 1 *s.* 2 *d.*$\frac{1}{2}$? *Anſw.* 196 *l.*

CASE 3.

Q. *When* A, P, *and* T, *are given to find* R; *how is it diſcovered?*

A. Thus; $\frac{a-p}{tp}=r.$

EXAMPLES.

1. At what Rate *per Cent.* will 567 *l.* 10 *s.* amount to 873 *l.* 19 *s.* in 9 Years? *Anſw.* 6 *l. per Cent.*

2. At what Rate *per Cent.* will 508 *l.* 14 *s.* amount to 534 *l.* 2 *s.* 8 *d.* 1.6 *qr.* in 1 Year? *Anſw.* 5 *l. per Cent.*

3. At what Rate *per Cent.* will 7200 *l.* amount to 9540 *l.* in $6\frac{1}{2}$ Years? *Anſw.* 5 *l. per Cent.*

4. At what Rate *per Cent.* will 1110 *l.* 18 *s.* amount to 1819 *l.* 1 *s.* 11 *d.* 2.8 *qrs.* in $12\frac{3}{4}$ Years? *Anſw.* 5 *l. per Cent.*

5. At what Rate *per Cent.* will 600 *l.* 14 *s.* amount to 871 *l.* 0 *s.* 3 *d.* 2.4 *qrs.* in 10 Years? *Anſw.* $4\frac{1}{2}$ *per Cent.*

6. At what Rate *per Cent.* will 4000 *l.* amount to 4700 *l.* in 5 Years? *Anſw.* $3\frac{3}{1}$ *per Cent.*

7. At what Rate *per Cent.* will 280 *l.* 10 *s.* amount to 328 *l.* 5 *s.* 2 *d.* 3.38 *qrs.* in 3 Years and 148 Days? *Anſw.* 5 *l. per Cent.*

8. At what Rate *per Cent.* will 196 *l.* amount to 200 *l.* 1 *s.* 2 *d.* $\frac{1}{2}$ in 189 Days? *Anſw.* 4 *l. per Cent.*

CASE 4.

Q. *When* A, P, *and* R, *are given to find* T; *how is it diſcovered?*

A. Thus; $\frac{a-p}{rp}=t.$

EXAMPLES.

1. In what Time will 567 *l.* 10 *s.* amount to 873 *l.* 19 *s.* at 6 *per Cent.?* *Anſw.* 9 *Years.*

2. In what Time will 508 *l.* 14 *s.* amount to 534 *l.* 2 *s.* 8 *d.* 1.6 *qr.* at 5 *per Cent.?* *Anſw.* 1 *Year.*

3. In what Time will 7200 *l.* amount to 9540 *l.* at 5 *per Cent.?* *Anſw.* $6\frac{1}{2}$ *Years.*

4. In what Time will 1110 *l.* 18 *s.* amount to 1819 *l.* 1 *s.* 11 *d.* 2.8 *qrs.* at 5 *per Cent.?* *Anſw.* $12\frac{3}{4}$ *Years.*

5. In what Time will 600 *l.* 14 *s.* amount to 871 *l.* 0 *s.* 3 *d.* 2.4 *qrs.* at $4\frac{1}{2}$ *per Cent.?* *Anſw.* 10 *Years.*

6. In what Time will 4000 *l.* amount to 4700 *l.* at $3\frac{1}{2}$ *per Cent.?* *Anſw.* 5 *Years.*

7. In what Time will 280 *l.* 10 *s.* amount to 328 *l.* 5 *s.* 2 *d.* 3.38 *qrs.* at 5 *per Cent.?* *Anſw.* 3 *Years* and 148 *Days.*

8. In what Time will 196 *l.* amount to 200 *l.* 1 *s.* 2 *d.*½ at 4 *per Cent.?* *Anſw.* 189 *Days.*

Of ANNUITIES *or* PENSIONS *in* ARREARS.

Q. *What is meant by* Annuities *or* Penſions *in* Arrears?

A. Annuities or *Penſions* are ſaid to be in *Arrears,* when they are payable, either Yearly, half Yearly, or Quarterly, and are unpaid for any Number of Payments.

Note, U, *repreſents the* Annuity, Penſion, *&c.* R, T, *and* A, *as before.*

CASE I.

Q. *When* U, R, *and* T, *are given to find* A; *how is it diſcovered?*

A. Thus; $\frac{tut - tu}{2} \times r : + tu = a.$

EXAMPLES.

1. If an Annuity of 70 *l.* be forborn 5 Years, what will it amount to in that Time at 5 *per Cent.?* *Anſw.* 385 *l.*

2. If the Payment of a Penſion be omitted for 7 Years; what will be the Amount in that Time at 6 *l. per Cent.* when the Penſion is 56 *l. per Ann.?* *Anſw.* 462 *l.* 11 *s.* 2 *d.* 1.6 *qr.*

3. An Houſe is lett upon Leaſe for 7 Years at 50 *l. per Ann.* I demand the Amount for that Time at 4 *l. per Cent.* for the Forbearance of Payment? *Anſw.* 392 *l.*

4. Suppoſe a Salary of 100 *l. per Ann.* be forborn 7 Years, what is the Amount at $4\frac{1}{2}$ *per Cent.?* *Anſw.* 794 *l.* 10 *s.*

Note, *When the* Annuities *or* Rents *are to be paid by* half-yearly *or* quarterly Payments, *as moſt generally they are, then,*

For half-yearly Payments, *take (always) half of the* Ratio, *half of the yearly Rent, and twice the Number of* Years; *that is, reduce the* Years *into* half Years, *for* R, U, *and* T; *But,*

For quarterly Payments, *take a fourth Part of the* Ratio, *a fourth Part of the yearly Rent, and four times the Number of* Years; *that is, reduce the* Years *into* Quarters, *and work as before.*

EXAMPLES.

5. If 70 *l.* Annuity payable every half Year, were unpaid 5 Years; what will it amount to in that Time at 5 *per Cent.?* *Anſw.* 389 *l.* 7 *s.* 6 *d.*

6. If 70 *l.* Annuity payable every Quarter, were unpaid 5 Years; what will it amount to in that Time at 5 *per Cent.*? *Anſw.* 391 *l.* 11 *s.* 3 *d.*

Note, *By comparing theſe two* Examples *with the firſt, it may be obſerved, that the Amount of half-yearly Payments is more advantagious than yearly Payments; and quarterly, than half-yearly Payments.*

CASE 2.

Q. *When* A, R, *and* T, *are given to find* U; *how is it diſcovered?*

A. Thus; $\frac{2a}{trt - tr + 2t} = u$.

EXAMPLES.

1. If the Amount of an Annuity for 5 Years at 5 *per Cent.* be 385 *l.* what is the Annuity? *Anſw.* 70 *l.*

2. If the Amount of a Penſion be 462 *l.* 11 *s.* 2 *d.* 1.6 *qr.* the Time be 7 Years, and the Rate *per Cent.* 6 *l.* what is the Penſion? *Anſw.* 56 *l.*

3. If an Houſe be lett upon Leaſe for 7 Years, and the Amount for that Time be 392 *l.* at 4 *per Cent.* what is the yearly Rent? *Anſw.* 50 *l.*

4. If a Salary amounts to 794 *l.* 10 *s.* in 7 Years, at $4\frac{1}{2}$ *per Cent.* what is the Salary? *Anſw.* 100 *l. per Ann.*

Note, *When the Payments are half-yearly,* 4a *muſt be divided; but when they are quarterly, then* 8a *muſt be divided, as before.*

EXAMPLES.

5. If the Amount of an Annuity, payable half-yearly, for 5 *Yrs.* at 5 *per Cent.* be 389 *l.* 7 *s.* 6 *d.* what is the Annuity? *Anſw.* 70 *l.*

6. If the Amount of an Annuity, payable quarterly for 5 *Yrs.* at 5 *per Cent.* be 391 *l.* 11 *s.* 3 *d.* what is the Annuity? *Anſw.* 70 *l.*

CASE 3.

Q. *When* U, A, *and* T, *are given to find* R; *how is it diſcovered?*

A. Thus; $\frac{2a - 2ut}{utt - ut} = r$.

EXAMPLES.

1. If an Annuity of 70 *l. per Ann.* amounts to 385 *l.* in 5 Years; I demand the Rate *per Cent.*? *Anſw.* 5 *l.*

2. If a Penſion of 56 *l. per Ann.* amounts to 462 *l.* 11 *s.* 2 *d.* 1.6 *qr.* in 7 Years; what is the Rate *per Cent.*? *Anſw.* 6 *l.*

3. If an Houſe be lett upon Leaſe for 7 Years at 50 *l. per Ann.* and the Amount for that Time be 392 *l.* what is the Rate *per Cent.*? *Anſw.* 4 *l. per Cent.*

4. If a Salary of 100 *l. per Ann.* being forborn 7 Years amounts to 794 *l.* 10 *s.* I demand the Rate *per Cent.*? *Anſw.* $4\frac{1}{2}$.

Note, *When the Payments are half-yearly, then* 4a—4ut *muſt be divided; but when they are quarterly, then* 8a — 8ut *muſt be divided, as before.*

EXAMPLES.

5. If an Annuity of 70 *l. per Ann.* payable half-yearly, being forborn 5 Years, amounts to 389 *l.* 7 *s.* 6 *d.* I demand the Rate *per Cent.?* *Anſw.* 5 *l. per Cent.*

6. If an Annuity of 70*l. per Ann.* payable quarterly, amounts to 391 *l.* 11 *s.* 3 *d.* in 5 Years; I demand the Rate *per Cent.?* *Anſw.* 5 *l. per Cent.*

CASE 4.

Q. *When* U, A, *and* R, *are given to find* T; *how is it diſcovered?*

A. Thus; Firſt $\frac{2}{r} - 1 = x.$

Secondly $\sqrt{\frac{2a}{ru} + \frac{xx}{4}} : - \frac{1}{2} x = t.$

EXAMPLES.

1. In what Time will 70 *l. per Ann.* amount to 385 *l.* forborn at 5 *per Cent.?* *Anſw.* 5 *Years.*

2. In what Time will a Penſion of 56 *l. per Ann.* amount to 462 *l.* 11 *s.* 2 *d.* 1.6*qr.* at 6 *per Cent.?* *Anſw.* 7 *Years.*

3. If an Houſe be lett upon Leaſe, for a certain Time, for 50 *l. per Ann.* and the Amount be 392 *l.* at 4 *per Cent.* I demand the Time it was lett for? *Anſw.* 7 *Years.*

4. If a Salary of 100 *l. per Ann.* being forborn a certain Time, amount to 794 *l.* 10 *s.* at 4½ *per Cent.* I demand the Time of Forbearance? *Anſw.* 7 *Years.*

Note, *If the Payments are half-yearly, then* T *will be equal to the Number of* Half-years, *or* Payments; *but if they were to be made* Quarterly, *then* T *will be equal to the Number of* Quarterly Payments.

EXAMPLES.

5. If an Annuity of 70*l. per Ann.* payable half-yearly, being forborn, amount to 389*l.* 7*s.* 6*d.* at 5 *per Cent.* I demand the Time and Payments forborn? *Anſw.* 10 *Payments* = 5 *Years.*

6. If an Annuity of 70 *l. per Ann.* payable quarterly, being forborn, amount to 391*l.* 11*s.* 3*d.* at 5 *per Cent.* I demand the Time and Payments forborn? *Anſw.* 20 *Payments* = 5 *Years.*

Of the PRESENT WORTH *of* ANNUITIES *or* PENSIONS, *&c.*

Note, P *repreſents the* preſent Worth; U, T, *and* R, *as in the laſt.*

CASE 1.

Q. *When* U, T, *and* R, *are given to find* P; *how is it diſcovered?*

A. Thus; $\frac{rtt - rt + 2t}{2rt + 2} : \times u = p.$

EXAM-

EXAMPLES.

1. What is the preſent Worth of 50*l. per Ann.* to continue 6 Years at 5 *per Cent.?* *Anſw.* 259*l.* 12*s.* 3 *d.* 2.4+*qrs.*

2. What is 80*l.* yearly Rent, to continue 5 Years, worth in ready Mony at 6 *per Cent.?* *Anſw.* 344*l.* 12*s.* 3*d.* 2.5+*qrs.*

3. What is a Salary of 40 *l. per Ann.* to continue 7 Years, worth in ready Mony at 4 *per Cent.?* *Anſw.* 245 *l.*

4. What is a Penſion of 30*l. per Ann.* for 5 Years worth in ready Mony at 4½ *per Cent.?* *Anſw.* 133*l.* 9*s.* 4*d.* 2.6+*qrs.*

Note, *Obſerve the ſame* Note *here, which is given in* Caſe 1, *in* Annuities *and* Penſions *in* Arrears, *concerning* half-yearly *and* quarterly Payments.

5. What is the preſent Worth of 50*l. per Ann.* payable half-yearly for 6 Years, at 5 *per Cent.?* *Anſw.* 262*l.* 10*s.*

6. What is the preſent Worth of 50*l. per Ann.* payable quarterly for 6 Years, at 5 *per Cent.?* *Anſw.* 263*l.* 18*s.* 9*d.* 3.6*qrs.*

Note, *By comparing theſe two* Examples *with the firſt, it may be obſerved, that the* preſent Worth *of* half-yearly Payments, *is more advantagious than* yearly Payments, *and the* preſent Worth *of* quarterly *than* half-yearly Payments.

CASE 2.

Q. *When* P, T, *and* R, *are given to find* U; *how is it diſcovered?*

A. Thus; $\frac{rt+1}{rtt-rt+2t} : \times 2p = u.$

EXAMPLES.

1. There is a Leaſe of an Houſe 6 Years to come; I demand the yearly Rent, when the preſent Worth at 5 *per Cent.* is 259*l.* 12*s.* 3*d.* 2*qrs.?* *Anſw.* 50*l. per Ann.*

2. What yearly Rent is that, the preſent Worth of which for 5 Years is 344*l.* 12*s.* 3*d.* 2*qrs.* at 6 *per Cent.?* *Anſw.* 80*l. per Ann.*

3. What Salary is that which for 7 Years Continuance at 4 *per Cent.* produces 245*l.* for the preſent Worth? *Anſw.* 40*l. per Ann.*

4. If the preſent Worth of a Penſion to continue 5 *Years* at 4½ *per Cent.* be 133*l.* 9*s.* 4*d.* 3*qrs.* I demand the Penſion? *Anſw.* 30*l.*

Note, *When the* Payments *to be made, are* half-yearly, *you muſt multiply by* 4p; *but when they are* quarterly, *then multiply by* 8p *to find* u.

EXAMPLES.

5. There is a Leaſe of an Houſe, payable half-yearly, for 6 Years to come; I demand the yearly Rent, when the preſent Worth at 5 *per Cent.* is 262*l.* 10*s.?* *Anſw.* 50*l.*

6. There is a Leaſe of an Houſe, payable quarterly, for 6 Years to come; I demand the yearly Rent, when the preſent Worth at 5 *per Cent.* is 263*l.* 18*s.* 9*d.* 3.6*qrs.?* *Anſw.* 50*l.*

CASE

CASE 3.

Q. *When* U, P, *and* T, *are given to find* R; *how is it diſcovered?*

A. Thus; $$\frac{2\,ut - 2\,p}{2pt - \overline{utt - ut}} = r.$$

EXAMPLES.

1. I demand at what Rate *per Cent.* will the yearly Rent of 50*l.* to continue 6 Years, produce the preſent Worth of 259*l.* 12*s.* 3*d.* 2*qrs.*? *Anſw.* 5 *l. per Cent.*

2. If the yearly Rent of 80*l. per Ann.* to continue 5 Years, bring 344*l.* 12*s.* 3*d.* 2*qrs.* preſent Worth; what is the Rate *per Cent.*? *Anſw.* 6 *l. per Cent.*

3. If a Salary of 40*l. per Ann.* to continue 7 Years, produce 245*l.* for the preſent Worth; what is the Rate *per Cent.*? *Anſw.* 4 *l. per Cent.*

4. If a Penſion of 30*l. per Ann.* to continue 5 Years, produce 133*l.* 9*s.* 4*d.* 2*qrs.* for the preſent Worth; what is the Rate *per Cent.*? *Anſw.* $4\frac{1}{2}$ *l. per Cent.*

Note, *When the* Annuities *or* Rents, *are to be paid half-yearly or quarterly, then*

For half-yearly Payments, take half *of the* Annuity *or* yearly Rent, *and* twice *the Number of Years; that is, reduce the* Years *into* half Years, *and then the* Quotient *of the upper Part divided by the lower, will be the* Ratio, *of* half *the* Rate *per Cent. But,*

For quarterly Payments, take a fourth Part *of the* Annuity *or* yearly Rent, *and* four *Times the Number of Years; that is, reduce the* Years *into* Quarters; *and then the* Quotient *of the upper Part divided by the lower, will be the* Ratio *of a* fourth Part *of the* Rate *per Cent.*

EXAMPLES.

5. A Leaſe of an Houſe of 50*l. per Ann.* payable half-yearly having 6 Years to come, is ſold for 262*l.* 10*s.* I demand the Rate *per Cent.*? *Anſw.* 5 *l. per Cent.*

6. A Leaſe of an Houſe of 50*l. per Ann.* payable quarterly, having 6 Years to come, is ſold for 263*l.* 18*s.* 9*d.* 3*qrs.* I demand the Rate *per Cent.*? *Anſw.* 5 *l. per Cent.*

CASE 4.

Q. *When* U, P, *and* R, *are given to find* T; *how is it diſcovered?*

A. Thus; Firſt, $$\frac{2}{r} - \frac{2p}{u} - 1 = x.$$

Secondly, $$\sqrt{\frac{2p}{ru} + \frac{xx}{4}} : - \frac{x}{2} = t.$$

EXAM-

EXAMPLES.

1. If 50*l.* yearly Rent, produce the preſent Worth of 259*l.* 12*s.* 3*d.* 2*qrs.* at 5 *per Cent.* what is the Time of its Continuance? *Anſw.* 6 *Years.*

2. I demand how long 80*l. per Ann.* may be purchaſed for 344*l.* 12*s.* 3*d.* 2*qrs.* at 6 *per Cent.?* *Anſw.* 5 *Years.*

3. How long muſt a Salary of 40*l. per Ann.* be enjoyed for 245*l.* at 4 *per Cent.?* *Anſw.* 7 *Years.*

4. What Time may a Penſion of 30*l. per Ann.* be bought for 133*l.* 9*s.* 4*d.* 2*qrs.* at 4½ *per Cent.?* *Anſw.* 5 *Years.*

Note 1. *If the Payments are to be half-yearly, then* U *will be* = half *of the given* Leaſe, Penſion, *&c. and* R *will be* = *half of the* Ratio *of the given* Rate; *and* T *which is required, will be* = *the Number of* Payments *or* half Years.

2. *If the Payments are to be quarterly, then* U *will be* = *a* fourth Part *of the given* Leaſe, Penſion, *&c. and* R *will be* = *a* fourth Part *of the* Ratio *of the given* Rate; *and* T *will be the Number of quarterly Payments.*

EXAMPLES.

5. A Leaſe of an Houſe of 50*l. per Ann.* payable half-yearly, is ſold for 262*l.* 10*s.* at 5 *per Cent.* I demand the Number of Payments, and the Time to come? *Anſw.* 12 *Payments* = 6 *Yrs.*

6. A Leaſe of an Houſe of 50*l. per Ann.* payable quarterly, is ſold for 263*l.* 18*s.* 9*d.* 3*qrs.* at 5 *per Cent.* I demand the Number of Payments, and the Time to come? *Anſw.* 24 *Payments* = 6 *Years.*

Of ANNUITIES, LEASES, *&c. taken in* REVERSION.

CASE I.

Q. *How do you find the* preſent Worth *of an* Annuity, *&c. in* Reverſion?

A. Thus; *Firſt*, find the *preſent Worth* of the yearly Sum at the given *Rate*, and for the Time of its Continuance; to do which, there are given *U*, *T*, and *R* to find *P*, which is thus diſcovered;

$$\frac{rtt - rt + 2t}{2rt + 2} : \times u = p.$$

Secondly, Find what *Principal* being put to *Intereſt* will amount to *P*, at the ſame *Rate*, and for the *Time* to come before the *Annuity*, &c. commences; and that will be the *preſent Worth* of the *Annuity*, &c. in *Reverſion:* Therefore let *P* be changed into *A* = the *Amount*, and then there will be given *A*, *R*, and *T*, to find *P*, or the *Principal*, which is thus diſcovered;

$$\frac{a}{tr + 1} = p.$$

EXAMPLES.

1. What is the preſent Worth of a Leaſe of 30 *l. per Ann.* to continue 3 Years; but is not to commence till the End of 2 *Yrs.* allowing 4 *per Cent.* to the Purchaſer? *Anſw.* 77 *l.* 7 *s.* 7.2 *d.*

2. I have the Promiſe of a Penſion of 17 *l. per Ann.* for 7 Years, but it does not commence till the End of 4 Years; and I am willing to diſpoſe of the ſame for preſent Payment, at the Rate of 5 *per Cent.* I demand the preſent Worth? *Anſw.* 84 *l.* 9 *s.* 6 *d.*

3. There is a Legacy of 20 *l. per Ann.* for 8 Years, left to a Perſon of 16 Years of Age; the Time of Payment is to commence at the Year of Perfection, *i. e.* at 21 Years; but he wanting a Sum of Mony, is minded to ſell the ſame at 4 *per Cent.* I demand the preſent Worth? *Anſw.* 115 *l.* 3 *s.* 0 *d.* 1.44 *qr.*

4. A good-natured Gentleman, being minded to beſtow a Favour upon an unthankful Wretch, ſettled upon him an Income of 35 *l. per Ann.* for 12 Years, to commence 5 Years after ſuch Settlement; but he wanting Mony to follow his Extravagances, ſold it at the Rate of 10 *per Cent.* I demand how much he received for the preſent Worth? *Anſw.* 197 *l.* 5 *s.* 5 *d.* 1.792 *qr.*

CASE 2.

Q. *How do you find the yearly Income of an* Annuity, *&c. in* Reverſion?

A. Thus; *Firſt*, Find the *Amount* of the *preſent Worth* of the yearly Sum, at the given Rate, and for the *Time* before the *Reverſion*; to do which, there are given *P*, *T*, and *R*, to find *A*, which is thus diſcovered;

$$ptr + p = a.$$

Secondly, Find what yearly Rent being ſold, will produce *A*, for the *preſent Worth*, at the ſame *Rate*, and for the *Time* of its Continuance; and that will be the yearly Sum required: Therefore change *A* into *P*, and then there will be given *P*, *R*, and *T*, to find *U*, or the yearly Sum, thus;

$$\frac{rt + 1}{rtt - rt + 2t} : \times 2p = u.$$

EXAMPLES.

1. There is a Leaſe of an Houſe taken for 3 Years, but commences not till the end of 2 Years; and the Leſſee would ſell the ſame for 77 *l.* 7 *s.* 7.2 *d.* preſent Payment, allowing 4 *per Cent.* to the Purchaſer; I demand the yearly Rent? *Anſw.* 30 *l. per Ann.*

2. I have the Promiſe of a Penſion for 7 Years, which will not commence till the end of 4 Years; and I have diſpoſed of the ſame for the preſent Payment of 84 *l.* 9 *s.* 6 *d.* allowing 5 *per Cent.* to the Purchaſer; I demand the yearly Income? *Anſw.* 17 *l.*

3. There is a Legacy of a certain Rate *per Ann.* for 8 *Yrs.* left to a Perſon of 16 Years of Age; but the Time of Paymnet muſt not commence till the Age of Perfection; and the ſame Perſon wanting a Sum of Mony, ſold it for 115*l.* 3*s.* 0*d.* 2*qrs.* allowing 4 *per Cent.* to the Buyer; I demand the yearly Rate? *Anſw.* 20*l.*

4. A good-natured Gentleman, being minded to beſtow a Favour upon an unthankful Wretch, ſettled an Income upon him for 12 Years, at a certain Rate *per Ann.* to commence 5 Years after ſuch Settlement; but he wanting Mony to follow his Extravagances, ſold it for 197*l.* 5*s.* 5*d.* 2*qrs.* allowing 10 *per Cent.* to the Buyer for preſent Payment; I demand the yearly Value? *Anſw.* 35*l.*

Of SIMPLE INTEREST *for* DAYS.

Q. *How do you find the* Simple Intereſt *of any Sum of Mony, for any Number of* Days?

A. Multiply the *Intereſt* of one Pound for one Day, at the given *Rate*, by the *Principal*, and by the Number of *Days*; the laſt *Product* is the *Intereſt* required.

Note, *The* Intereſt *of one* Pound *for one* Day *at*

1	per Cent.	is =	.00002739726
2		is =	.00005479452
3		is =	.00008219178
4		is =	.00010958904
5		is =	.0001369863
6		is =	.00016438356
7		is =	.00019178082
8		is =	.00021917808
9		is =	.00024657534
10		is =	.0002739726

EXAMPLES.

1. What is the Intereſt of 120*l.* for 126 Days, at 4 *per Cent.*? *Anſw.* 1*l.* 13*s.* 1*d.* 2*qrs.*+

2. What is the Intereſt of 126*l.* for 145 Days, at 6 *per Cent.*? *Anſw.* 3*l.* 0*s.* 0*d.* 3*qrs.*+

3. What is the Intereſt of 100*l.* from the 1ſt of *June*, 1760, to the 8th of *March* following, at 5 *per Cent.*? *Anſw.* 3*l.* 16*s.* 11*d.* 3*qrs.*

4. What is the Intereſt of 200*l.* from the 14th of *Auguſt*, 1761, to the 19th of *December* following, at 6 *per Cent.*? *Anſw.* 4*l.* 4*s.* 1*d.* 3*qrs.*+

5. What is the Intereſt of 10*l.* for 25 Days, at 5 *per Cent.*? *Anſw.* 8*d.*+

6. What is the Intereſt of 40*l.* for 40 Days, at 4 *per Cent.*? *Anſw.* 3*s.* 6*d.*+

Note, *There is another Way of anſwering* Queſtions *in* Intereſt *for* Days, *which is laid down in* Caſe 1, *in* Simple Intereſt, Page 132, *as appears by the eighth Queſtion in that* Caſe. *The Reader may uſe which he likes beſt; or both if he pleaſes.*

Of REBATE *or* DISCOUNT.

Q. *What particular* Letters *are uſed in* Rebate?

A. Theſe;

S, the *Sum* to be *diſcounted*.

P, the *preſent Worth* of that Sum, due at any Time to come.

T, the *Time* before it becomes due.

R, the *Ratio*, or the Rate *per Cent.*

CASE 1.

Q. *When* S, T, *and* R, *are given to find* P; *how is it diſcovered?*

A. Thus; $\frac{s}{tr+1}=p$.

EXAMPLES.

1. What is the preſent Worth of 795 *l.* 11 *s.* 2 *d.* for 11 Months, at 6 *per Cent.*? *Anſw.* 754 *l.* 1 *s.* 8 *d.*+

2. What is the preſent Worth of 161 *l.* 10 *s.* for 19 Months, at 5 *per Cent.*? *Anſw.* 149 *l.* 13 *s.* 0 *d.* 3 *qrs.*+

3. If a Legacy of 1000 *l.* is left me the 24th of *July* 1761, to be paid on the *Chriſtmas-day* following; what muſt I receive when I allow 6 *per Cent.* for preſent Payment? *Anſw.* 975 *l.* 3 *s.* 0 *d.* 3 *qrs.*+

CASE 2.

Q. *When* P, T, *and* R, *are given to find* S; *how is it diſcovered?*

A. Thus; $ptr+p=s$.

EXAMPLES.

1. Suppoſe I receive 754 *l.* 1 *s.* 8 *d.* now, for a Sum of Mony, due 11 Months hence, allowing 6 *per Cent.* for preſent Payment; I demand the Sum that was due at firſt? *Anſw.* 795 *l.* 11 *s.* 2 *d.*

2. There is a certain Debt, payable 19 Months hence; but I agree with the Debtor to pay me down 149 *l.* 13 *s.* 0 *d.* $\frac{3}{4}$ and allow him 5 *per Cent.* for preſent Payment; I demand how much the Debt is? *Anſw.* 161 *l.* 10 *s.*

3. A Legacy was left me the 24th of *July* 1761, to be paid on the *Chriſtmas-day* following, but I agree with the Executor, and allow him 6 *per Cent.* for the preſent Payment of 975 *l.* 3 *s.* 0 *d.* 3 *qrs.* I demand what the Legacy was? *Anſw.* 1000 *l.*

CASE 3.

Q. *When* S, P, *and* R, *are given to find* T; *how is it diſcovered?*

A. Thus; $\frac{s-p}{rp}=t$.

EXAMPLES.

1. The preſent Worth of 795 *l.* 11 *s.* 2 *d.* due for a certain Time to come, is 754 *l.* 1 *s.* 8 *d.* at 6 *per Cent.* I demand in what Time the firſt Sum ſhould have been paid, if no Rebate had been made? *Anſw.* 11 *Months.*

2. There is 161 *l.* 10 *s.* due at a certain Time to come, but I allow 5 *per Cent.* to the Debtor, for the preſent Payment of 149 *l.* 13 *s.* 0 *d.* 3 *qrs.* I demand when the Sum ſhould have been paid without any Rebate? *Anſw.* 19 *Months.*

3. I have received 975 *l.* 3 *s.* 0 *d.* 3 *qrs.* for a Legacy of 1000 *l.* allowing the Executor 6 *per Cent.* I demand when the Legacy was payable, without Rebate? *Anſw.* 155 *Days.*

CASE 4.

Q. *When* S, P, *and* T, *are given to find* R; *how is it diſcovered?*

A. Thus; $\frac{s-p}{tp}=r.$

EXAMPLES.

1. At what Rate *per Cent.* will 795 *l.* 11 *s.* 2 *d.* payable 11 Months hence, produce 754 *l.* 1 *s.* 8 *d.* for preſent Payment? *Anſw.* 6 *per Cent.*

2. At what Rate *per Cent.* will 161 *l.* 10 *s.* payable 19 Months hence, produce the preſent Payment of 149 *l.* 13 *s.* 0 *d.* 3 *qrs.*? *Anſw.* 5 *per Cent.*

3. Suppoſe a Legacy of 1000 *l.* is left me the 24th of *July* 1761, to be paid on the *Chriſtmas-day* following; but I agree with the Executor for the preſent Payment of 975 *l.* 3 *s.* 0 *d.* 3 *qrs.* I demand the Rate *per Cent.* allowed for his Mony? *Anſw.* 6 *per Cent.*

Of EQUATION *of* PAYMENTS (*the true Way.*)

Q. *How is the equated* Time *for the Payment of a Sum of* Mony, *due at ſeveral* Times, *found out?*

A. Thus; 1. Find the *preſent Worth* of each Payment for its reſpective *Time,* as in *Rebate*; that is,

$$\frac{s}{tr+1}=p.$$

2. Add all the *preſent Worths* together, and call that Sum alſo *P*; then is $s-p=d$ the *Rebate.*

3. $\frac{a}{pr}=e$ is the true equated *Time.*

EXAMPLES.

1. *A.* owes *B* 200 *l.* to be paid as follows, *viz.* 100 *l.* at 2 Months; and 100*l.* at 4 Months; but they agree to have but one Payment of the Whole, Rebate being made at 6 *per Cent.* I demand the true equated Time? *Anſw.* 3 *Months.*

2. A Merchant hath owing him 300*l.* to be paid as follows; 50 *l.* at 2 Months, 100 *l.* at 5 Months, and the reſt at 8 Months; and it is agreed to have but one Payment of the Whole, Rebate being made at 5 *per Cent.* I demand the equated Time? *Anſw.* 5.9796 *Months.*

3. *F* owes to *H* 1000*l.* whereof 200*l.* is to be paid preſent; 400*l.* at 5 Months; and the reſt at 10 Months; but they agree to have but one Payment of the Whole, at the Rate of 4 *per Cent.* Rebate; I demand the true equated Time? *Anſw.* 181 *Days.*

4. A Man owes to a Merchant 1200 *l.* to be paid as follows, 200 *l.* down; 500 *l.* at the End of 10 Months; and the reſt at the End of 20 Months; and they agree to have but one Payment of the Whole, Rebate at 3 *per Cent.* I demand the true equated Time? *Anſw.* 1 *Year* 11 *Days.*

Of COMPOUND INTEREST.

Q. WHAT *particular* Letters *are uſed here?*
A. theſe;
P, the *Principal*;
T, the *Time*;
R, the *Amount* of 1 *l.* for 1 Year, at any given Rate;
A. the whole *Amount.*

Q. *How is the* Amount of 1 *l.* for 1 Year, *at any propoſed* Rate *per Cent. found?*

A. Thus; As 100 : 106 : : 1 : 1.06
100 : 105 : : 1 : 1.05 *&c.*

A TABLE of the AMOUNTS of 1 *l.* for 1 Year.

Rates per Ct.	*Amts. of* 1 *l.*	*Rates per Ct.*	*Amts. of* 1*l.*
2	1.02	6½	1.065
3	1.03	7	1.07
3½	1.035	7½	1.075
4	1.04	8	1.08
4½	1.045	8½	1.085
5	1.05	9	1.09
5½	1.055	9½	1.095
6	1.06	10	1.1

CASE 1.

Q. *When* P, T, *and* R, *are given to find* A; *how is it diſcovered?*

A. Thus; $p \times r^t = a$.

Note, R *muſt be involved ſo many times as the Number of Years direct, and that will be* r^t.

EXAMPLES.

1. What Sum will 450*l.* amount to in three Years Time at 5 *per Cent. per Ann.?* *Anſw.* 520*l.* 18*s.* 7*d.* 2*qrs.*

2. What will 400*l.* amount to in 4 Years at 6 *per Cent. per Ann.?* *Anſw.* 504*l.* 19*s.* 9*d.* 3.15264*qrs.*

3. What will 484*l.* amount to in 6 Years at 5 *per Cent. per Ann.?* *Anſw.* 643*l.* 4*s.* 11.0178*d.*

4. What is the Amount of 500*l.* at 4¼ *per Cent. per Ann.* for 4 Years? *Anſw.* 590*l.* 11*s.* 5*d.* 2.95+*qrs.*

CASE 2.

Q. *When* A, R, *and* T, *are given to find* P; *how is it diſcovered?*

A. Thus; $\dfrac{a}{r^t} = p$.

EXAMPLES.

1. What Principal muſt be put to Intereſt, to amount to the Sum of 520*l.* 18*s.* 7*d.* 2*qrs.* in 3 Years, at 5 *per Cent. per Ann.?* *Anſw.* 450*l.*

2. What Principal will amount to 504*l.* 19*s.* 9*d.* 3.15264*qrs.* in 4 Years, at 6 *per Cent. per Ann.?* *Anſw.* 400*l.*

3. What Principal will amount to 643*l.* 4*s.* 11.0178*d.* in 6 Years, at 5 *per Cent. per Ann.?* *Anſw.* 480*l.*

4. What Principal will amount to 590*l.* 11*s.* 5*d.* 3*qrs.* in 4 Years, at 4¼ *per Cent. per Ann.?* *Anſw.* 500*l.*

CASE 3.

Q. *When* P, R, *and* A, *are given to find* T; *how is it diſcovered?*

A. Thus; $\dfrac{a}{p} = r^t \left\{ \begin{array}{l} \text{which being continually divided by } r, \\ \text{till nothing remains, the Number of} \\ \text{thoſe Diviſions will be } = t. \end{array} \right.$

EXAMPLES.

1. In what Time will 450*l.* amount to 520*l.* 18*s.* 7*d.* *qrs.* at 5 *per Cent. per Ann.?* *Anſw.* 3 *Years.*

2. In what Time will 400*l.* amount to 504*l.* 19*s.* 9*d.* 2*qrs.* at 6 *per Cent. per Ann.?* *Anſw.* 4 *Years.*

3. In what Time will 480*l.* amount to 643*l.* 4*s.* 11.1*d.* at 5 *per Cent. per Ann.?* *Anſw.* 6 *Years.*

4. In what Time will 500*l.* amount to 590*l.* 11*s.* 5*d.* 3*qrs.* at 4¼ *per Cent. per Ann.?* *Anſw.* 4 *Years.*

CASE 4.

Q. *When* P, A, *and* T, *are given to find* R; *how is it diſcovered?*

A. Thus; $\frac{a}{p} = r^t$ $\left\{\right.$ which muſt be extracted by the Rules of Extraction; the Time given in the Queſtion $= t$, ſhewing the Power.

EXAMPLES.

1. At what Rate *per Cent.* will 450*l.* amount to 520*l.* 18*s.* 7*d.* 2*qrs.* in 3 Years? *Anſw.* 5 *per Cent.*

2. At what Rate *per Cent.* will 400*l.* amount to 504*l.* 19*s.* 9*d.* 3.2*qrs.* in 4 Years? *Anſw.* 6 *per Cent.*

3. At what Rate *per Cent.* will 480*l.* amount to 643*l.* 4*s.* 11.1*d.* in 6 Years? *Anſw.* 5 *per Cent.*

4. At what Rate *per Cent.* will 500*l.* amount to 590*l.* 11*s.* 5*d.* 3*qrs.* in 4 Years? *Anſw.* 4¼ *per Cent.*

Of ANNUITIES *or* PENSIONS *in* ARREARS.

CASE 1.

Note, U *repreſents the* Annuity, Penſion, *&c.* T, R, *and* A, *as before.*

Q. *When* U, T, *and* R, *are given to find* A; *how is it diſcovered?*

A. Thus; $\frac{ur^t - u}{r - 1} = a$.

EXAMPLES.

1. What will an Annuity of 30*l. per Ann.* payable yearly, amount to in 4 Years, at 5 *per Cent.?* *Anſw.* 129*l.* 6*s.* 0*d.* 3.6*qrs.*

2. Suppoſe a Penſion of 50*l. per Ann.* payable yearly, be granted to a ſuperannuated Officer; what is the Amount for 5 Years Forbearance, at 4 *per Cent.?* *Anſw.* 270*l.* 16*s.* 3*d.* 3.4+*qrs.*

3. If the yearly Rent of an Houſe, which is 40*l.* be forborn 7 Years, at 6 *per Cent.* what is the Amount? *Anſw.* 335*l.* 15*s* 0*d.* 3.3+*qrs.*

4. If a Salary of 35 *l. per Ann.* to be paid yearly, be omitte for 6 Years, at 5½ *per Cent.* what is the Amount? *Anſw.* 241*l.* 1*s.* 7*d.* 2.5+*qrs.*

CASE 2.

Q. *When* R, T, *and* A, *are given to find* U; *how is it diſcovere*

A. Thus; $\frac{ra - a}{r^t - 1} = u$.

EXAMPLE

EXAMPLES.

1. What Annuity being forborn for 4 Years, will amount to 129*l.* 6*s.* 1*d.* at 5 *per Cent.*? *Anſw.* 30*l. per Annum.*

2. If a Penſion being forborn for 5 Years, at 4 *per Cent. per Ann.* amount to 270*l.* 16*s.* 4*d.* I demand how much it is *per Ann.*? *Anſw.* 50*l. per Ann.*

3. If the yearly Rent of an Houſe, being forborn for 7 Years, at 6 *per Cent.* amount to 335*l.* 15*s.* 0*d.* 3.4*qrs.* I demand what the Rent is? *Anſw.* 40*l. per Ann.*

4. If the Payment of a Salary be omitted 6 Years; I demand how much the Salary is, when the Amount is 241*l.* 1*s.* 7*d.* 2.6*qrs.* at 5½ *per Cent.* *Anſw.* 33*l. per Ann.*

CASE 3.

Q. *When* U, A, *and* R, *are given to find* T; *how is it diſcovered?*

A. Thus; $\frac{ar + u - a}{u} = r^t$ which being continually divided by r, till nothing remains, the Number of thoſe Diviſions will be $= t$.

EXAMPLES.

1. In what Time will 30*l. per Ann.* amount to 129*l.* 6*s.* 1*d.* allowing 5 *per Cent.* for the Forbearance of Payment? *Anſw.* 4 *Years.*

2. In what Time will a Penſion of 50*l. per Ann.* amount to 270*l.* 16*s.* 4*d.* at 4 *per Cent.*? *Auſw.* 5 *Years.*

3. In what Time will the yearly Rent of an Houſe, being 40*l. per Ann.* amount to 335*l.* 15*s.* 1*d.* at 6 *per Cent.* for Nonpayment? *Anſw.* 7 *Years.*

4. In what Time will a Salary of 35*l. per Ann.* amount to 241*l.* 1*s.* 7*d.* 2.6*qrs.* at 5½ *per Cent.* for the Forbearance of Payment? *Anſw.* 6 *Years.*

Note, *In this and the two next* Sections *might be placed* Caſe 4; *but becauſe it requires an* Algebraic Method *of proceeding, in order to find* R, *I omit inſerting it in its Place; this being deſigned to treat only of* Numbers.

Of the PRESENT WORTH *of* ANNUITIES, PENSIONS, &c.

Note, P, *is the* Preſent Worth, U, T, *and* R, *as in the laſt.*

CASE 1.

Q. *When* U, T, *and* R, *are given to find* P; *how is it diſcovered?*

A. Thus; $\frac{u - \frac{u}{r^t}}{r - 1} = p.$

EXAMPLES.

1. What is the yearly Rent of 20*l.* to continue 6 Years, worth in ready Mony, at 5 *per Cent.?* *Anſw.* 101*l.* 10*s.* 3*d.* 3*qrs.*

2. What is the preſent Worth of a Penſion of 30*l.* *per Ann.* for 5 Years, at 4 *per Cent.?* *Anſw.* 133*l.* 11*s.* 1*d.*

3. What muſt be the Diſcount of a Leaſe of 50*l.* *per Ann.* when preſent Payment is made for 4 Years at 3 *per Cent.?* *Anſw.* 14*l.* 2*s.* 10*d.* 2*qrs.*

4. An Houſe is lett upon Leaſe for 4 Years at 70*l.* *per Ann.* and the Leſſee is deſirous to make preſent Payment, provided the Leſſor will allow him 5$\frac{3}{4}$ *per Cent.* I demand how much muſt be paid down, and how much diſcounted?

Anſw. { 243*l.* 19*s.* 0*d.* 3*qrs.* *to be paid down.*
36*l.* 0*s.* 11*d.* 1*qr.* *to be diſcounted.*

CASE 2.

Q. *When* P, T, *and* R, *are given to find* U; *how is it diſcovered?*

A. Thus; $\frac{\overline{pr^t \times r - pr^t}}{r^t - 1} = u.$

EXAMPLES.

1. What Annuity or yearly Rent to continue 6 Years, may be purchaſed for 101*l.* 10*s.* 3*d.* 3*qrs.* at 5 *per Cent.?* *Anſw.* 20*l.*

2. Suppoſe the preſent Payment of 133*l.* 11*s.* 1*d.* were required for a Penſion for 5 Years to come, at 4 *per Cent.* what is that Penſion? *Anſw.* 30*l.* *per Ann.*

3. If the preſent Payment of 185*l.* 17*s.* 1*d.* 2*qrs.* be made for the Leaſe of an Houſe, 4 Years to come, at 3 *per Cent.* what is the yearly Rent? *Anſw.* 50*l.* *per Ann.*

4. If an Houſe is lett upon Leaſe for 4 Years, and the Leſſee makes preſent Payment of 243*l.* 19*s.* 0*d.* 3*qrs.* for that Time at 5$\frac{3}{4}$ *per Cent.* what is the yearly Rent of that Houſe? *Anſw.* 70*l.* *per Ann.*

CASE 3.

Q. *When* U, P, *and* R, *are given to find* T; *how is it diſcovered?*

A. Thus; $\frac{u}{p + u - pr} = r^t$ } which being continually divided by r, till nothing remains, the Number of thoſe Diviſions will be $= t$.

EXAMPLES.

1. How long may a Leaſe of 20*l* yearly Rent be had for 101*l.* 10*s.* 3*d.* 3*qrs.* allowing 5 *per Cent.* to the Purchaſer? *Anſw.* 6 *Years.*

2. I demand what Time a Leaſe of 30*l. per Ann.* may be purchaſed for; when preſent Payment of 133*l.* 11*s.* 1*d.* is made at 4 *per Cent.*? *Anſw.* 5 *Years.*

3. If 185*l.* 17*s.* 1*d.* 2*qrs.* be paid down for a Leaſe of 50*l. per Ann.* at 3 *per Cent.* how long is the Leaſe purchaſed for? *Anſw.* 4 *Years.*

4. An Houſe is lett upon Leaſe for 70*l. per Ann.* and the Leſſee makes preſent Payment of 243*l.* 19*s.* 0*d.* 3*qrs.* he being allowed $5\frac{3}{4}$ *per Cent.* I demand how long the Leaſe is purchaſed for? *Anſw.* 4 *Years.*

Of ANNUITIES, LEASES, *&c. taken in* REVERSION.

CASE I.

Q. *How many* Operations *are there in* Caſe 1?

A. Two.

Q. *What is the* Firſt?

A. Find the *preſent Worth* of the yearly *Sum* at the given *Rate*, and for the given *Time* of its Continuance; to do which, there are given *U*, *T*, and *R*, to find *P*.

Q. *How is* P *diſcovered?*

A. Thus; $\dfrac{u - \dfrac{u}{r^t}}{r - 1} = p.$

Q. *What is the* Second?

A. Find what *Principal* being put to Intereſt will amount to *P*, at the ſame *Rate*, and for the *Time* to come before the *Annuity* commences, and that will be the *preſent Worth* of the Annuity, *&c.* in *Reverſion*; therefore let *P* be changed into *A* = the Amount, and then there will be given *A*, *R*, and *T*, to find *P*, or the *Principal*.

Q. *How is* P *diſcovered?*

A. Thus; $\dfrac{a}{r^t} = p.$

EXAMPLES.

1. What is the preſent Worth of the Reverſion of a Leaſe of 20*l. per Ann.* to continue 4 Years, but not to commence till the End of two Years, allowing 5 *per Cent.* to the Purchaſer? *Anſw.* 64*l.* 6*s.* 6*d.* 1.4+*qr.*

2. There is a Leaſe of certain Lands worth 32*l. per Ann.* which is yet in being for 4 Years; and the Leſſee is deſirous to take a Leaſe in Reverſion for 7 Years, to begin when the old Leaſe ſhall be expired; I demand the preſent Worth of the ſaid Leaſe in Reverſion, allowing 5 *per Cent.* to the Purchaſer? *Anſw.* 152*l.* 6*s.* 8*d.* 2*qrs.*+

3. There is an Houſe now building, which I have a mind to take a Leaſe of for 8 Years; but the Houſe will not be finiſhed within 2 Years; I demand how much I muſt pay down, when the yearly Rent is 100*l.* and the Landlord allows me 4 *per Cent.* on preſent Payment? *Anſw.* 622*l.* 9*s* 7.2*d.*

CASE 2.

Q. *How many Operations are there in* Caſe 2?

A. Two.

Q. *What is the* Firſt?

A. Find the *Amount* of the preſent Worth of the yearly Sum at the given *Rate*, and for the Time before the Annuity commences, to do which there are given *P*, *R*, and *T*, to find *A*.

Q. *How is* A *diſcovered?*

A. Thus; $pr^t = a$.

Q. *What is the* Second?

A. Find what yearly Rent being ſold will produce *A* for the *preſent Worth*, at the ſame Rate, and for the Time of its Continuance; and that will be the yearly *Sum* required: Therefore let *A* be changed into *P*, and then there will be given *P*, *R*, and *T*, to find *U*, or the yearly *Sum*?

Q. *How is* U *diſcovered?*

A. Thus; $\dfrac{\overline{pr^t \times r} - pr^t}{r^t - 1} = u.$

EXAMPLES.

1. What Annuity or yearly Rent to be entered upon 2 Years hence, and then to continue 4 Years, may be purchaſed for 64*l.* 6*s.* 6*d.* 2 *qrs.* ready Mony at 5 *per Cent.*? *Anſw.* 20*l.*

2. There is a Leaſe of certain Lands in being for 4 Years, and the Leſſee being minded to take a Leaſe in Reverſion for 7 Years, to begin when the old Leaſe ſhall be expired, laid down 152*l.* 6*s.* 8*d.* 2*qrs.* I demand the yearly Rent of the ſaid Lands, when Allowance was made to the Leſſee at 5 *per Cent.*? *Anſw.* 32 *l. per Annum.*

3. The preſent Payment for the Leaſe of an Houſe is 622 *l.* 9 *s.* 7.2*d.* Now I have taken a Leaſe in Reverſion for 8 Years, which is to commence at the End of two Years; I demand how much the yearly Rent is, when for the ſaid preſent Payment I was allowed 4 *l. per Cent.*? *Anſw.* 100 *l. per Ann.*

CASE 3.

Q. *How many Operations are there in* Caſe 3?

A. Two.

Q. *What is the* Firſt?

A. Find the Amount of the preſent Worth of the yearly Sum at the given Rate, and for the Time before the Annuity, *&c.* commences; to do which, there are given *P, R,* and *T,* to find *A,* as in Caſe 2.

Q. *How is* A *diſcovered?*

A. Thus; $pr^t = a$.

Q. *What is the* ſecond Operation?

A. Find what Time the yearly Rent given, being ſold for will produce *A* for the preſent Worth, at the ſame Rate, and that will be the Time required: Therefore change *A* into *P*, and then there will be given *U, P,* and *R,* to find *T,* as in Caſe 3, *Page* 148.

Q. *How is* T *diſcovered?*

A. Thus; $\frac{u}{p+u-pr} = r^t$ $\Big\{$ which being continually divided by *r*, till nothing remains, the Number of thoſe Diviſions will be $= t$.

EXAMPLES.

1. The preſent Worth of a certain Leaſe in Reverſion is 64 *l.* 6 *s.* 6 *d.* 2 *qrs.* the Leaſe is 20 *l. per Ann.* and commences two Years hence, and the Allowance to the Purchaſer is 5 *per Cent.* I demand the Time of its Continuance? *Anſw.* 4 *Years.*

2. A certain Man took a Leaſe of ſome Lands for a Time, which by Agreement was not to commence till the Expiration of 4 Years; the yearly Rent was 32 *l.* it was alſo agreed, that the Purchaſer ſhould lay down 152 *l.* 6 *s.* 8 *d.* 2 *qrs.* and be allowed for his preſent Pay 5 *per Cent.* I demand the Time that the Leaſe was taken for? *Anſw.* 7 *Years.*

3. The preſent Payment for the Leaſe of an Houſe is 622 *l.* 9 *s.* 7.2 *d.* and the yearly Rent is 100 *l.* Now I have taken a Leaſe in Reverſion, which is to commence at the End of 2 Years; I demand the Length of the Leaſe, when I was allowed 4 *per Cent.* for my Mony? *Anſw.* 8 *Years.*

Of purchaſing REAL *or* FREEHOLD ESTATES.

Q. *What do you underſtand by a* Real *or* Freehold Eſtate?

A. Such as is bought to continue for ever.

Note, U, *repreſents the* yearly Rent; R, *the* Amount *of* 1 *l.* &c. *and* P, *the* preſent Worth.

CASE 1.

Q. *When* U, *and* R, *are given to find* P; *how is it diſcovered?*

A. Thus; $\frac{u}{r-1}=p$.

EXAMPLES.

1. Suppoſe a Freehold Eſtate of 40*l. per Ann.* is to be ſold; what is it worth, allowing the Buyer 5 *per Cent.* for his Mony? *Anſw.* 800*l.*

2. What is an Eſtate of 290*l. per Ann.* to continue for ever, worth in preſent Mony, allowing 4 *per Cent.* to the Buyer? *Anſw.* 7250*l.*

CASE 2.

Q. *When* P, *and* R, *are given to find* U; *how is it diſcovered?*

A. Thus; $p\times\overline{r-1}=u$.

EXAMPLES.

1. If a Freehold Eſtate is bought for 800*l.* and the Allowance of 5 *per Cent.* is made to the Buyer; I demand the yearly Rent? *Anſw.* 40*l. per Ann.*

2. If an Eſtate be ſold for 7250*l.* preſent Mony, and 4 *per Cent.* is allowed to the Buyer for the ſame; I demand the yearly Rent? *Anſw.* 290*l. per Ann.*

CASE 3.

Q. *When* P, *and* U, *are given to find* R; *how is it diſcovered?*

A. Thus; $\frac{p+u}{p}=r$.

EXAMPLES.

1. If a Real Eſtate of 40*l. per Ann.* be ſold for 800*l.* I demand the Rate *per Cent. Anſw.* 5 *per Cent.*

2. If a Freehold Eſtate of 290*l. per Ann.* be bought for 7250*l.* I demand the Rate *per Cent.* allowed? *Anſw.* 4 *per Cent.*

Of

Of purchaſing FREEHOLD ESTATES *in* REVERSION.

CASE 1.

Q. *How many Operations are there in* Caſe 1?

A. Two.

Q. *What is the* Firſt?

A. Find the *preſent Worth* of the yearly Sum at the given *Rate*; to do which, there are given *U*, and *R*, to find *P*.

Q. *How is* P *diſcovered?*

A. Thus; $\frac{u}{r-1}=p$.

Q. *What is the ſecond* Operation?

A. Find what *Principal* being put to *Intereſt* will amount to *P*, at the ſame *Rate*, and for the *Time* to come before the Eſtate commences, and that will be the *preſent Worth* of the Eſtate in *Reverſion*: Therefore let *P*, be changed into *A* = the *Amount*, and then there will be given *A*, *R*, and *T*, to find *P* = the *Principal*.

Q. *How is* P *diſcovered?*

A. Thus; $\frac{a}{r^t}=p$.

EXAMPLES.

1. Suppoſe a Freehold Eſtate of 40 *l. per Ann.* to commence 3 Years hence, is to be ſold, what is it worth, allowing the Purchaſer 5 *per Cent.* for his preſent Payment? *Anſw.* 691 *l.* 1 *s.* 4 *d.* 3 *qrs* +

2. What is an Eſtate of 290 *l. per Ann.* to continue for ever, but not to commence till the Expiration of 4 Years, worth in preſent Mony, Allowance being made at 4 *per Cent.*? *Anſw.* 6197 *l.* 6 *s.* 5 *d.* 2 *qr.* +

CASE 2.

Q. *How many* Operations *are there in* Caſe 2?

A. Two.

Q. *What is the* Firſt?

A. Find the *Amount* of the *preſent Worth* of the yearly Rent, at the given *Rate*, and for the *Time* before the Eſtate commences; to do which, there are given *P*, *T*, and *R*, to find *A*.

Q. *How is* A *diſcovered?*

A. Thus; $pr^t = a$.

Q. *What is the* ſecond Operation?

A. Find what yearly Rent being ſold will produce *A* for the *preſent Worth*, at the ſame *Rate*, and that will be the yearly Sum required: Therefore let *A* be changed into *P*, and then there will be given *P*, and *R*, to find *U*, or the yearly *Sum*.

Q. *How is* U *diſcovered?*

A. Thus; $\frac{\overline{pr \times r - pr.}}{r} = u.$

EXAMPLES.

1. Suppoſe a Freehold Eſtate, to commence 3 Years hence, is ſold for 691 *l.* 1 *s.* 5 *d.* allowing to the Purchaſer 5 *per Cent.* I demand the yearly Income? *Anſw.* 40 *l. per Ann.*

2. There is a certain Freehold Eſtate bought for 6197 *l.* 6 *s.* 5 *d.* 2 *qrs.* which does not commence till the Expiration of 4 Years; the Buyer was allowed 4 *per Cent.* for his Mony; I demand the yearly Income? *Anſw.* 290 *l. per Ann.*

Of REBATE *or* DISCOUNT.

Q. *What particular* Letters *are uſed here?*

A. Theſe;

S, the Sum to be diſcounted for;
P, the preſent Worth of that Sum, due at any Time to come;
T, the Time before it becomes due; and
R, the Amount of 1 *l.* for 1 Year, at any Rate *per Cent.*

CASE I.

Q. *When* S, T, *and* R, *are given to find* P; *how is it diſcovered?*

A. Thus; $\frac{s}{r^t} = p.$

EXAMPLES.

1. What is the preſent Worth of 520 *l.* 18 *s.* 7 *d.* 2 *qrs.* payable 3 Years hence at 5 *per Cent.*? *Anſw.* 450 *l.*

2. There is a Debt of 504 *l.* 19 *s.* 9 *d.* 3 *qrs.* which is not due until 4 Years hence, but is agreed to be paid in preſent Mony; what Sum muſt the Creditor receive, allowing the Rebate of 6 *per Cent.* to the Debtor for his Mony? *Anſw.* 400 *l.*

3. If 643*l.* 4*s.* 11*d.* be payable in 6 Years Time; what is the preſent Worth, Rebate being made at 5 *per Cent.*? *Anſw.* 480*l.*

CASE 2.

Q. *When* P, T, *and* R, *are given to find* S; *how is it diſcovered?*

A. Thus; $p \times r^t = s$.

EXAMPLES.

1. If 450*l.* be received for a Debt, payable 3 Years hence, and an Allowance of 5 *per Cent.* was made to the Debtor for his preſent Payment; I demand what the Debt was? *Anſw.* 520*l.* 18*s.* 7*d.* 2*qrs.*

2. There is a Sum of Mony due at the Expiration of 4 Years, but the Creditor agrees to take 400*l.* down, allowing 6 *per Cent.* on preſent Payment; I demand what the Debt was? *Anſw.* 504*l.* 19*s.* 9*d.* 3*qrs.*

3. If a Sum of Mony, due 6 Years hence, produces 480*l.* for preſent Payment, Rebate being made at 5 *per Cent.* I demand how much the Debt was? *Anſw.* 643*l.* 4*s.* 11*d.*

CASE 3.

Q. *When* S, P *and* R, *are given to find* T; *how is it diſcovered?*

A. Thus; $\frac{s}{p} = r^t$ {which being continually divided by r, till nothing remains, the Number of thoſe Diviſions will be $= t$.

EXAMPLES.

1. A certain Man received 450*l.* down, for a Debt of 520*l.* 18*s.* 7*d.* 2*qrs.* Rebate being made at 5 *per Cent.* I demand in what Time the Debt was payable? *Anſw.* 3 *Years.*

2. There is a Debt of 504*l.* 19*s.* 9*d.* 3*qrs.* payable at a certain Time; but it is agreed to pay 400*l.* down at the Allowance of 6 *per Cent.* to the Debtor for his preſent Mony; I demand in what Time the Debt would become due, if no ſuch Payment was to be made? *Anſw.* 4 *Years.*

3. The preſent Payment of 480*l.* is made for a Debt of 643*l.* 4*s.* 11*d.* Rebate at 5 *per Cent.* I demand when the Debt was payable? *Anſw.* 6 *Years.*

CASE

CASE 4.

Q. *When* S, P, *and* T, *are given to find* R; *how is it diſcovered?*

A. Thus; $\frac{s}{p} = r^{t}\;\left\{\begin{array}{l}\text{which muſt be extracted by the Rules}\\ \text{of Extraction; the Time given in the}\\ \text{Queſtion} = t\text{, ſhewing the Power.}\end{array}\right.$

EXAMPLES.

1. The preſent Worth of 520*l.* 18*s.* 7*d.* 2*qrs.* payable 3 Years hence is 450*l.* I demand at what Rate *per Cent.* Rebate is made? *Anſw.* 5 *per Cent.*

2. A Debt of 504*l.* 19*s.* 9*d.* 3*qrs.* will be due 4 Years hence; but it is agreed to take 400*l.* down; what is the Rate *per Cent.* that the Rebate is made at? *Anſw.* 6 *per Cent.*

3. The Sum of 643*l.* 4*s.* 11*d.* is payable in 6 Years time; and the preſent Worth of that Sum is 480*l.* I demand at what Rate *per Cent.* muſt Rebate be made, to produce the ſaid preſent Worth? *Anſw.* 5 *per Cent.*

Note 1, Equation *of* Payments *at* Compound Intereſt, *ſhould follow next; but as that* Rule *is beſt done by the* Logarithms, *the kind Reader will I hope, take this as a ſufficient* Reaſon *for not placing it here.*

2. *The whole Buſineſs of* Compound Intereſt, *is better performed by the* Logarithms, *or by* Tables *calculated for that Purpoſe, than otherwiſe; eſpecially when the* Time *given is very long, as for* 20, 30, *or* 40 Years, *and when the* Payments *are to be made* half-yearly *or* quarterly. *What is here done ſerves only for whole* Years, *and ſhews what can be done by the* Pen, *where the* Logarithms *or* Tables *are wanting.*

A practical and eaſy *Method* to caſt up the *Value* of *Timber.*

Rule. Multiply the Number of *Feet* by the *Price* in (*Shillings*) per *Load*, and cut off 3 Places to the right Hand, which make *Pounds* and Decimal Parts thereof.

EXAMPLES.

754 Feet at 1*l.* 7*s.* 6*d. per* Load.

```
  754      754 at 6d. = 377
   27
 -----
 20358
+  377      l.  s.  d.
 -----
20.735  =  20  14  9¼
```

856 Feet at 1*l.* 6*s. per* Load.
Facit 22*l.* 5*s.* 1*d.* $\frac{1}{4}$

730 Feet at 1*l.* 8*s.* 6*d. per* Load.
Facit 20*l.* 16*s.* 1*d.*

433 Feet at 1*l.* 3*s.* 6*d. per* Load.
Facit 10*l.* 3*s.* 6*d.*

Demonſtration. 50 *Feet* make a *Load*; therefore it is, As 50 *Feet* . . Price in *Shillings* : : *Feet* given . . Value in *Shillings*, which ÷ 20 are *Pounds*: But as 50 × 20 = 1000 which is a *Diviſor* for *Pounds*; therefore the firſt Figure being 1, and the reſt Cyphers, *Diviſion* is made at once by pointing off 3 Places as above.

THE

THE
Schoolmaſters Aſſiſtant.

PART IV.

A Collection of QUESTIONS *to exerciſe the foregoing* RULES.

1. WRITE down nine Hundred Millions, ſeven Hundred ſixty Thouſand, and Twenty-one.

2. What muſt 20*s.* pay towards a Tax, when 326*l.* 6*s.* 8*d.* is aſſeſſed at 41*l.* 16*s.* 2*d.*? *Anſw.* 2*s.* 6*d.* 2*qrs.* $\frac{77600}{78320}$.

3. If the $\frac{1}{3}$ of 6 be 3; what will the $\frac{1}{4}$ of 20 be? *Anſw.* $7\frac{1}{2}$.

4. I demand the Sum of 1748 added to itſelf; *Anſw.* 3496.

5. I demand the Product of 76 multiplied by itſelf? *Anſw.* 5776.

6. I demand the Difference between 14676 and the Fourth of itſelf? *Anſw.* 11007.

7. I demand the Quotient of the Square of 476 divided by the half of its Root? *Anſw.* 952.

8. There is, in 3 Bags, the Sum of 1468*l.* *viz.* in the firſt Bag 461*l.* in the ſecond 581*l.* I demand what is in the third Bag? *Anſw.* 426*l.*

9. What Number is that which being multiplied by 13, the Product will be 221? *Anſw.* 17.

10. Two Perſons, *A* and *B*, owe ſeveral Debts; the leſſer Debt, being that of *A*, is 2173*l.* the Difference is 371*l.* what is the Debt of *B*? *Anſw.* 2544*l.*

11. A Captain and 160 Sailors took a Prize. worth 1360*l.* of which the Captain had $\frac{1}{5}$ for his Share, and the reſt was equally divided among the Sailors; what was each Man's Part? *Anſw. The Captain had* 272*l.* *and each Sailor had* 6*l.* 16*s.*

12. An ancient Lady being demanded how old ſhe was; to avoid a direct Anſwer, ſaid, I have 9 Children, and there are 3 Years between the Birth of each of them; the Eldeſt was born when I was 19 Years old, which is now exactly the Age of the Youngeſt; how old was the Lady? *Anſw.* 62 *Years old.*

13. What Number is that from which if you take 341, the Remainder will be 726? *Anſw.* 1067.

14. What Number is that which being added to 168, makes the Sum to be 706? *Anſw.* 538.

15. What Number is that which being divided by 19, the Quotient will be 72? *Anſw.* 1368.

16. A Broker bought for his Principal, in the Year 1720, 400*l.* Capital Stock in the *South Sea*, at 650 *per Cent.* and ſold it again when it was worth but 130 *per Cent.* how much was loſt in the Whole? *Anſw.* 2080*l.*

17. The Sum of two Numbers is 4139, their Difference is 948; what is the leſſer Number? *Anſw.* 1595.5.

18. A Gentleman went to Sea at 17 Years of Age; 8 Years after that, he had a Son born, who lived 46 Years, and died before his Father; after whom the Father lived twice 20 Years, and then died alſo; I demand the Age of the Father when he died? *Anſw.* 111 *Years.*

19. Three Gardners, *A*, *B*, and *C*, having bought a Piece of Ground, find the Profits of it amount to 120*l.* *per Annum*: Now the Sum of Mony which they laid down was in ſuch Proportion, that as often as *A* paid 5*l.* *B* paid 7*l.* and as often as *B* paid 4*l.* *C* paid 6*l.* I demand how much each Man muſt have *per Annum* of the Gain?

B		*A*		*B*		*A*
7	:	5	: :	4	:	$2\frac{6}{7}$
A		*C*		*A*		*C*
$2\frac{6}{7}$	:	6	: :	5	:	$10\frac{1}{2}$

		l.	*s.*	*d.*
Anſw.	*A*	26	13	4
	B	37	6	8
	C	56	0	0
		120	0	0

20. *A*, *B*, and *C*, freight a Ship with Wine, *viz.* *A* lays out 1342*l.* *B* 1178*l.* *C* 630*l.* the whole 212 Tuns are ſold at 32*l.* *per* Tun; what ſhall each Man receive?

		l.	*s.*	*d.*	*qr.*
Anſw.	*A*	2890	3	11	$3\frac{1230}{3150}$
	B	2537	$\frac{2}{3150}$		
	C	1356	16	0	

21. *A*, *B*, and *C*, made up a Stock of 1000*l.* whereof *A* put in 409*l.* *B* 198*l.* and they improved it to 1964*l.* I demand what was the Stock of *C*, and what was each Man's Share of the whole Gain?

		l.	*s.*	*d.*
Anſw.	C'*s* *Stock was*	393	0	0
	A'*s* *Share was*	803	5	$6\frac{240}{1000}$.
	B'*s* - - - -	308	17	$5\frac{280}{1000}$.
	C'*s* - - - -	771	17	$0\frac{480}{1000}$

22. *A*, *B*, and *C*, freight a Ship for the *Canaries* worth 3696 *l.* whereof *A* put in 369 *l.* *B* 897 *l.* but by reaſon of a Storm, one third of the Goods were caſt overboard; I demand each Man's Share of the Loſs? *Anſw.* A's *Loſs was* 123 *l.* B's 299 *l.* *and* C's 810 *l.*

23. *A* and *B* traded together, and gained 100 *l.* *A* put in 640 *l.* *B* put in ſo much that he muſt receive 60 *l.* of the Gain; I demand how much *B* put in? *Anſw* 960 *l.*

24. What is the Value of 27 Dozen, 10 *lb.* of Candles at 5 *d. per lb.*? *Anſw.* 6 *l.* 19 *s.* 2 *d.*

25. Bought 28 *qrs.* 2 *buſh.* of Wheat, at 4 *s.* 6 *d. per* Buſhel; what is the Worth of it? *Anſw.* 50 *l.* 17 *s.*

26. If a Man earn 2 *s.* 6 *d.* 2 *qrs. per* Day, how much is that for 19 Weeks, *Sundays* excepted? *Anſw.* 14 *l.* 9 *s.* 9 *d.*

27. *A*, *B*, and *C*, traded together, the firſt laid in I know not how much; *B* put in 20 Pieces of Cloth; and *C* put in 500 *l.* and they have gained 1000 *l.* whereof *A* ought to have 350 *l.* and *B* 400 *l.* I demand C's Share, how much the firſt Man laid in, and what the 20 Pieces of Cloth were worth? *Anſw.* C's *Share was* 250 *l.* A *laid in* 700 *l.* *and* B's *Cloth was worth* 800 *l.*

28. A Merchant buys up ſix Bags of *Canterbury* Hops, No. 1. of which weighed *C. wt* 3 3 20. No. 2. *C. wt.* 3 2 26. No. 3. *C. wt.* 3 0 24. No. 4. *C. wt.* 3 3 only. No. 5. *C. wt.* 2 2 22. No. 6. *C. wt.* 2 2 26, beſides 5 Pockets, 3 of which weighed 76 *lb.* $\frac{3}{4}$ each, and the other two 62 *lb.* $\frac{1}{4}$ each: How many *C. wt.* has he to pay Carriage for? *Anſw.* *C. wt.* 23 0 $24\frac{3}{4}$.

29. How many Ducats muſt I deliver at *Venice*, to receive at *London* 178 *l.* 2 *s.* the Exchange being at 4 *s.* 4 *d. per* Ducat? *Anſw.* 822 *Ducats.*

30. A Traveller would change 500 *French* Crowns at 4 *s.* 6 *d. per* Crown into Sterling Mony, but he muſt pay a Halfpenny *per* Crown for Change; how much muſt he receive? *Anſw.* 111 *l.* 9 *s.* 2 *d.*

31. When a Factor taketh 1 *l. per Cent.* for his Commiſſion, what muſt he have for 743 *l.* 17 *s* 3 *d.*? *Anſw.* 7 *l.* 8 *s.* 9 *d.* 1 *qr.* $\frac{192}{2400}$.

32. Two Merchants in Company gained 100 *l.* *A* laid in ſo much, that for his Share of the Gain he muſt have 60 *l.* *B* laid in 720 Ducats at 6 *s.* 8 *d. per* Ducat; I demand how much *A* laid in, and what the Ducats were worth? *Anſw.* A *laid in* 360 *l.* *and the Ducats were worth* 240 *l.*

33. There were two Merchants who traded in Company: The firſt laid in the Sum of 640*l.* and took $\frac{5}{8}$ of the Gain; I demand how much the ſecond Merchant laid in? *Anſw.* 384*l.*

34. What Number is that, which being multiplied by 15, the Product will be $\frac{3}{4}$? *Anſw.* $\frac{1}{20}$.

35. I demand the $\frac{5}{8}$ of 20 Shillings? *Anſw.* 12*s.* 6*d.*

36. What Fraction is that, to which if you add $\frac{2}{5}$ the Sum will be $\frac{5}{6}$? *Anſw.* $\frac{13}{30}$.

37. What Number is that, to which if you add $7\frac{2}{3}$ the Whole will be $12\frac{1}{4}$? *Anſw.* $4\frac{7}{12}$.

38. What Number is that, from which if you take $\frac{3}{5}$ the Remainder will be $\frac{1}{8}$? *Anſw.* $\frac{29}{40}$.

39. What Number is that, from which if you take $13\frac{1}{2}$ the Remainder will be $5\frac{5}{7}$? *Anſw.* $19\frac{3}{14}$.

40. What Number is that, which being divided by $\frac{3}{4}$ the Quotient will be 21? *Anſw.* $15\frac{3}{4}$.

41. What Number is that, which being multiplied by $\frac{2}{3}$ produceth $\frac{1}{4}$? *Anſw.* $\frac{3}{8}$.

42. What Number is that, from which if you take $\frac{2}{5}$ of itſelf, the Remainder will be 12? *Anſw.* 20.

43. What Part of 25 is $\frac{5}{8}$ of an Unit? *Anſw.* $\frac{1}{40}$.

44. What Number is that, to which if you add its own $\frac{2}{3}$ the Whole ſhall be 20? *Anſw.* 12.

45. What Number is that, which maketh 9 to be the $\frac{2}{3}$ of it? *Anſw.* $13\frac{1}{2}$.

46. If a Cannon may be diſcharged at twice with 6*lb.* of Powder; how many Times will 7*C.* 3*qrs.* 17*lb.* diſcharge the ſame Piece? *Anſw.* 295 *Times.*

47. If $\frac{3}{8}$ of a Ship be worth 3740*l.* what is the Whole worth? *Anſw.* 9973*l.* 6*s.* 8*d.*

48. A young Man received 210*l.* which was $\frac{2}{3}$ of his elder Brother's Portion; now three Times the elder Brother's Portion was half of the Father's Eſtate; I demand how much the Eſtate was? *Anſw.* 1890*l.*

49. A Factor bought a certain Quantity of broad Cloth, and Drugget, which together coſt him 81*l.* The Quantity of broad Cloth that he bought was 50 Yards, at 18*s. per* Yard, and for every five Yards of broad Cloth, he had nine Yards of Drugget; I demand how many Yards of Drugget he had, and how much the Drugget coſt him *per* Yard? *Anſw.* 90 *Yards of Drugget, at* 8*s. per Yard.*

50. A certain Uſurer lent out 90*l.* for 12 Months, and received Principal and Intereſt 95*l.* 8*s.* I demand at what Rate *per Cent.* he received Intereſt? *Anſw.* 6*l. per Cent.*

51. Two Men depart both from one Place, the one goes *North*, and the other *South*, the one goes 7 Miles a Day, and the other 11 Miles a Day; how far are they diſtant the 12th Day after their Departure? *Anſw.* 216 *Miles.*

52. A Merchant bought 8 Tuns of Wine, which having received Damage, he ſold for 400*l.* and 12*l. per Cent.* Loſs; I demand how much it coſt him *per* Tun, and how he ſold it *per* Gallon, to loſe after the ſaid Rate?

Anſw. *Coſt* – 56*l.* 0*s.* 0*d. per Tun.*
Sold at 0*l.* 3*s.* 11*d.* 2*qrs.* $\frac{960}{2010}$ *per Gallon.*

53. Two Men depart both from one Place, and both go the ſame Road; the one travels 12 Miles every Day, the other 17 Miles every Day; how far are they diſtant the tenth Day after their Departure? *Anſw.* 50 *Miles.*

54. If a Gentleman hath an Eſtate of 1000*l. per Ann.* how much may he ſpend one Day with another, to lay up threeſcore Guineas at the Year's End? *Anſw.* 2*l.* 11*s.* 4*d.* $\frac{40}{365}$.

55. If 76*lb.* of Cinnamon coſt 40*l.* 10*s.* 8*d.* and 1 *C. wt.* of Nutmegs 59*l.* 14*s.* 8*d.* I demand the Price of 3*oz.* one with another? *Anſw.* 2*s.*

56. A Grocer delivered 17*C.* 3*qrs.* 10*lb.* of Tobacco in the Roll to be cut and dried, and when it came home, it held out 16*C.* 0*qr.* 14*lb.* I demand how much was loſt in every *lb.* and alſo ſuppoſing it coſt in the Roll 8*d.* $\frac{6}{7}$ *per lb.* and the cutting 1*d.* $\frac{5}{8}$ *per lb.* I demand what it now ſtands him in?

Anſw. *Loſt per lb.* 1*oz.* 8*dr.* $\frac{1200}{1998}$.
It ſtands him in 87*l.* 5*s.* 3*d.* 1*qr.* $\frac{16}{56}$.

57. If Tallow be ſold for 4*d. per lb.* what is the Value of 3 Tubs, each 3 *C.* 1*qr.* 10*lb.* Groſs, Tare *per* Tub 25*lb.*? *Anſw.* 17*l.* 9*s.*

58. Ship'd from *Spain* 10 Tuns of Wine, at 10*l.* Sterling *per Hhd.* paid Cuſtom at the Port of *London* 1*s. per* Gallon: The Charges for Lighterage, Cartage, and Porterage, amounted to 5*l.* afterwards by the Misfortune of a Pipe ſtaving, containing 126 Gallons, I loſt 59 Gallons; the next Day 28 Gallons more run out, and the Remainder of the Pipe not being ſaleable, I threw it away: The Market-Price not running high, I ſold the reſt for 17*l. per Hhd.* I demand how much I gain'd or loſt by the Sale of the ſaid Wine? *Anſw. Gain'd* 115*l.*

59. A Ship's Company took a Prize of 300*l.* which is to be divided among them, according to their Pay, and the Time they have been on board; the Officers and Midſhipmen 5 Months, and the Sailors 3 Months. The Officers, one with another, had 40*s. per* Month: The Midſhipmen 30*s. per* Month, and the Sailors 22*s.* There were 6 Officers, 12 Midſhipmen, and 84 Sailors; what muſt each Party have of the Prize, and what each ſingle Perſon?

Anſw.	*l.*	*s.*	*d.*	*qrs.*	*each Man.*	*l.*	*s.*	*d.*	*qr.*
The Officers	144	4	7	$1\frac{224}{476}$		24	0	9	0+
Midſhipmen	108	3	5	$2\frac{64}{476}$		9	0	3	1+
Sailors – –	47	11	11	$0\frac{128}{486}$		0	11	3	3+

60. If 1000*lb.* of Beef ſerve 240 Men 8 Days, how many *lb.* will ſerve 460 Men 10 Weeks? *Anſw.* 16770*lb.* 13*oz.* $\frac{640}{1920}$.

61. What is the Amount of 1000*l.* for 5 Years and a Half, at $4\frac{3}{4}$ *per Cent.* ſimple Intereſt? *Anſw.* 1261*l.* 5*s.*

62. Sold Goods, amounting to the Value of 700*l.* for two 4 Months; what is the preſent Worth, at 5 *per Cent.* ſimple Intereſt? *Anſw.* 682*l.* 19*s.* 5*d.* 2*qrs.*

63. A Merchant bought 400 Cloths, at 12*l. per* Cloth, which he ſhipped for *Spain*, to have Returns from thence, the one half in Wine, at 30*l. per* Tun, and the other half in Rice, at 28*s. per C. wt.* I demand how much of each muſt be returned for the Cloths? *Anſw.* 80 *Tuns of Wine; and* 1714*C.* 1*qr.* 4*lb. of Rice.*

64. A Tobacconiſt hath ſeveral ſorts of Tobacco, *viz.* of 12*d. per lb.* of 16*d. per lb.* of 18*d. per lb,* and of 2*s. per lb.* and he is deſirous to make a Mixture of an *C. wt.* worth 20*d. per lb.* I demand how much of each ſort muſt be taken;

Anſw.	*lb.*	*oz.*		*d. per lb.*
	17	$3\frac{18}{26}$	*at*	12
	17	$3\frac{18}{26}$	*at*	16
	17	$3\frac{18}{26}$	*at*	18
	60	$4\frac{24}{26}$	*at*	24

65. A Brewer mixed 17 Gallons of Ale, at 8*d. per* Gallon, with 19 Gallons at 10*d. per* Gallon, and with 40 Gallons at 6*d. per* Gallon; I demand what one Gallon of this Mixture is worth; and alſo the Worth of the whole Quantity?

Anſw. 0*l.* 0*s.* 7*d.* 1*qr.* $\frac{60}{76}$ *per Gallon.*
2*l.* 7*s.* 2*d. the Price of the whole Mixture.*

66. There are two Numbers, the one 48, the other twice as much; I demand the Difference between their Sum and Difference? *Anſw.* 96.

67. There are two Numbers, the one 63, the other half as much; I demand the Product of their Squares, and the Difference of their Product and Sum?

Anſw. { *Product of the Squares* 3938240.25
Difference - - - - - - - 1890.

68. There are two Numbers, the one 25, the other the Square of 25; I demand the Square-Root of the Sum of their Squares? *Anſw.* 625.4998+

69. There are two Numbers, whoſe Product is 1058, and Multiplicand 46; I demand the Multiplier; the Sum of the Factors, and the Difference between the Sum of the Cubes of the Factors, and the Square of the Product?

Anſw. { *Multiplier* - - - 23.
Sum of the Factors 69.
Difference - 1009861.

70. There are two Numbers whoſe Dividend is 1216, and the Quotient 76; I demand the Diviſor; the Difference between the Cube of the Quotient, and the Sum of the Squares of the Diviſor and Dividend; and the Cube-Root of the Sum of the Cubes of the Diviſor, Dividend and Quotient?

Anſw. { *Diviſor* - - - - 16.
Difference 1039936.
Cube-Root - - 1216.

71. Two Men ſet out at the ſame time from the ſame Place, but go contrary Ways; and they travel each of them 34 Miles a Day: I demand the Time in which they will have travelled 2000 Miles? *Anſw.* 29 *Days*, 9 *Hrs.* 52 *Min.* $\frac{64}{68}$.

72. Six Rogues, *viz.* *A*, *B*, *C*, *D*, *E*, and *F*, having entered into a Confederacy, do agree to divide whatever Sums of Mony they ſhall at any time take upon the Highways, according to their Valour, that is in proportion to the Number of Scars they ſhould then have on their Faces: Now the firſt two, *viz.* *A*, and *B*, being very bold and daring Fellows, had received *A* 20, and *B* 19 Scars: The next two, *viz.* *C*, and *D*, having a leſs Share of Courage, and not caring to ſtand all Brunts, had each of them but 9 Scars; but the other two, *viz.* *E*, and *F*, being mere Cowards, always turned their Backs at the leaſt Oppoſition, and ſo by Chance they had one a-piece; and they having, at ſeveral times, ſtolen the Sum of 700 *l.* 13 *s.* do deſire to know how they muſt divide it?

Anſw.

		l.	*s.*	*d.*	*qrs.*
Anſw.	A *muſt have*	237	10	2	$0\frac{8}{59}$.
	B ------	225	12	7	$3\frac{43}{59}$.
	C ------	106	17	6	$3\frac{39}{59}$.
	D ------	106	17	6	$3\frac{39}{59}$.
	E ------	11	17	6	$0\frac{24}{59}$.
	F ------	11	17	6	$0\frac{24}{59}$.

73. There are three Numbers, 17, 19 and 48; I demand the Difference between the Sum of the Squares of the firſt and laſt, and the Cube of the Middlemoſt? *Anſw.* 4266.

74. In 7 Cheeſes, each weighing 1 *C.* 2 *qrs.* 5 *lb.* how many Allowances for Sea-Men may be cut, each weighing 5 *oz.* 7 *drams*? *Anſw.* 3563 $\frac{35}{87}$ *Allowances.*

75. In 81034 Rundlets of Brandy, each 18 Gallons, how many Groſs of Bottles each $\frac{8}{9}$ of a Quart? *Anſw.* 45581 *groſs,* 7 *doz.* 6 *Bottles.*

76. In 731 *doz.* Bottles of Wine, each 1 $\frac{5}{7}$ Pint, how many Hhds.? *Anſw.* 29 *hhds.* 52 *gals.* 5 *pts.* $\frac{5}{7}$.

77. Sold 8 *C.* $\frac{1}{2}$ of Steel, at 12 *d. per lb.* how much *Flemiſh* Mony at 33 *s.* 8 *d. per* Pound Sterling, am I to receive for the ſame? *Anſw.* 80 *l.* 2 *s.* 6 *d.* $\frac{96}{240}$ *Flemiſh.*

78. If 48 taken from 120 leave 72, and 72 taken from 91 leave 19, and 7 taken from thence leave 12; what Number is that, out of which, when you have taken 48, 72, 19, and 7 leaves 12? *Anſw.* 158.

79. *A* hath $\frac{1}{2}$ of a Ship, *B* $\frac{1}{4}$, *C* $\frac{1}{16}$, *D* $\frac{3}{16}$; the Maſter clears 120 *l.* how much muſt each Owner have?

		l.	*s.*
Anſw.	A *muſt have*	60	0
	B ------	30	0
	C ------	7	10
	D ------	22	10

80. A Gentleman having 50 *s.* to pay amoung his Labourers for a Day's Work, would give to every Boy 6 *d.* to every Woman 8 *d.* and to every Man 16 *d.* the Number of Boys, Women, and Men, was the ſame; I demand the Number of each? *Anſw.* 20 *of each ſort.*

81. A Gentleman had 7 *l.* 17 *s.* 6 *d.* to pay among his Labourers; to every Boy he gave 6 *d.* to every Woman 8 *d.* and to every Man 16 *d.* and there were for every Boy three Women, and for every Woman two Men; I demand the Number of each? *Anſw.* 15 *Boys,* 45 *Women,* 90 *Men.*

82. Admit a Tax of 39*l.* is laid on a Town for the building of a Bridge, and the Value of the Town-Rent is 900*l. per Ann.* what ſhall a Man pay towards it, whoſe Income is worth 100*l. per Ann.?* *Anſw.* 4*l.* 6*s.* 8*d.*

83. Suppoſe *A* hath an Eſtate of 53*l. per Ann.* and pays 5*s.* 10*d.* to a Subſidy; what ſhall *B* pay, whoſe Eſtate is worth 100*l. per Ann.?* *Anſw.* 11*s.* 0*d.* $\frac{4}{53}$.

84. If 136*l.* are to be divided between two Men, ſo as the leſſer Share may have ſuch Proportion to the greater as 2 to 5, what muſt each Man have?

		l.	*s.*	*d.*	*qrs.*
Anſw.	*One muſt have*	38	17	1	$2\frac{0}{7}$.
	The other - -	97	2	10	$1\frac{1}{7}$.

85. There are 1000*l.* to be divided among 3 Men, in ſuch Manner, that if *A* have 3*l.* *B* ſhall have 5*l.* and *C* 8*l.* how much muſt each Man have?

		l.	*s.*
Anſw.	A *muſt have*	187	10
	B - - - - - -	312	10
	C - - - - - -	500	0

86. Ship'd for *Jamaica* 550 Pair of Stockings, at 11*s.* 6*d. per* Pair, and 460 Yards of Stuff, at 14*d. per* Yard; in return for which, I had 46C. 3*qrs.* of Sugar, at 24*s.* 6*d. per C.* and 1570*lb.* of Indigo, at 2*s.* 4*d. per lb.* what remains due to me of my Adventure? *Anſw.* 102*l.* 12*s.* 11*d.* 2*qrs.*

87. If one Pound ten, and forty Groats
Will buy a Load of Hay;
How many Pounds with nineteen Crowns
For twenty Loads will pay? *Anſw.* 38*l.* 11*s.* 8*d.*

88. A Man driving his Geeſe to the Market, was met by another, who ſaid, Good-morrow Maſter with your Hundred Geeſe. Says he, I have not an Hundred; but if I had half as many as I now have, and two Geeſe and an half, beſide the Number I have already, I ſhould have an Hundred: How many had he? *Anſw.* 65.

89. If a Tower be 384 Feet high from the Foundation, and a ſixth Part be under the Earth, and an eight Part under the Water; how much in height is viſible? *Anſw.* 272 *Feet.*

90. A Merchant would lay out in Spices 560*l.* at the following Prices, *viz.* Cloves at 4*s. per lb.* Mace at 7*s.* Cinnamon at 3*s.* Nutmegs at 12*s.* and Pepper at 2*s. per lb.* and he would have an equal Quantity of each Sort; I demand that Quantity? *Anſw.* 400*lb.* of each Sort.

91. The computed Diſtance between *London* and *York* is 150 Miles; now if a Man ſet out from *London*, and walk every Day towards *York* 20 Miles, and back again toward *London* 15 Miles; how long will it be before he gets to his Journey's End? *Anſw.* 30 *Days.*

92. Bought 127 Pieces of Cloth, for which I delivered 3589 Ells of Holland, at 7 *s.* 11 *d. per* Ell *Engliſh*; what coſt a Piece of that Cloth? *Anſw.* 11 *l.* 3 *s.* 8 *d.* 2 *qrs.* $\frac{94}{127}$.

93. The Account of a certain School is as followeth; *viz.* $\frac{1}{16}$ of the Boys learn Geometry, $\frac{3}{8}$ learn Grammar, $\frac{3}{10}$ learn Arithmetic, $\frac{3}{20}$ learn to write, and 9 learn to read; I demand the Number of each? *Anſw.* 5 *Geometers,* 30 *Grammarians,* 24 *Arithmeticians,* 12 *Writers, and* 9 *Readers.*

94. I have laid out for a Merchant 638 *l.* 17 *s.* 3 *d.* he allows me $2\frac{3}{4}$ *per Cent.* before that, I owed him 184 *l.* 17 *s.* 9 *d.* how much is he indebted to me? *Anſw.* 471 *l.* 10 *s.* 10 *d.* 1 *qr.*

95. Bought a Tun of Wine for 78 *l.* 17 *s.* at what Price muſt I ſell it *per* Quart to gain 5 *l.* 10 *s.* by the Whole, when there were 22 Gallons leaked out? *Anſw.* 22 *d.*+

96. If out of 10 *s. per* Week I lay up 4 *d.* 2 *qrs. per* Day, *Sundays* excepted; and have ſaved 9 *l.* 2 *s.* 3 *d.* how long was I in laying it up; and how much have I ſpent in that Time?

Anſw. { 567 *Days in laying up.*
31 *l.* 7 *s.* 9 *d. ſpent.*

97. If I buy 1000 Ells *Flemiſh* of Linen for 90 *l.* what may I ſell it *per* Ell in *London* to gain 10 *l.* by the Whole? *Anſw.* 3 *s.* 4 *d. per* Ell.

98. Bought threeſcore Pieces of Holland for three times as many Pounds, and ſold them again for four times as much; but if they had coſt me as much as I ſold them for, what ſhould I have ſold them for, to gain after the ſame Rate? *Anſw.* 320 *l.*

99. There are three Quantities of Silver, each of the ſame Weight, but different in Value; the Weight of each Quantity is 10 *oz.* the Value of the firſt Sort is 4 *s. per oz.* of the ſecond 4 *s.* 6 *d. per oz.* and of the third 5 *s. per oz.* I demand the Worth of an *Oz.* when they are all melted down together? *Anſw.* 4 *s.* 6 *d. per oz.*

100. I have received Advice from my Factor, that he ha diſburſed upon my Account, the Sum of 4000 Guilders, 1 Stivers; I demand what Sum I muſt anſwer for that in *Engliſ* Mony, Exchange at Par; and alſo what his Commiſſion come to at 2 *per Cent.*?

Anſw. { 400 *l.* 1 *s.* 6 *d. Sterling.*
8 *l.* 0 *s.* 0 *d.* 1 *qr. Commiſſion.*

101.

101. A Merchant bought a Parcel of Jewels for 220 *l.* and ſold them again for 440 *l.* payable at the End of 6 Months; I demand what the Gain was worth in ready Mony, Rebate being made at 6 *per Cent.*? *Anſw.* 213 *l.* 11 *s.* 10 *d.*

102. A Factor bought 4 Cheſts of Sugar, the Mark and Weight as follows;

	C.	*qrs.*	*lb.*
A - - - - -	10	3	14
B - - - - -	12	1	17
C - - - - -	13	1	19
D - - - - -	11	2	10

now ſuppoſe the Tare or Weight of every Cheſt, when it is empty, to be 38 *lb.* I demand the neat Weight of the ſaid Sugar; alſo I demand the Prime Coſt of the ſame, ſuppoſing it came to 18 *s.* *per C.* including the Charges of Lighterage, Porterage, Warehouſe-Room, Cuſtom, &c. alſo I demand the whole Gain, and the Gain *per Cent.* ſuppoſing the Cheſts *A* and *B* were ſold afterwards at 28 *s.* *per C.* and the other two Cheſts, *viz.* *C* and *D*, at 4 *d.* *per lb.*

		l.	*s.*	*d.*
Anſw.	*Prime Coſt* - - - - -	42	4	$8\frac{1}{2}$
	Whole Gain - - - - -	34	16	$4\frac{1}{2}$
	Gain per Cent. - - -	82	8	$9\frac{1}{2}$

103. A Gentleman a Chaiſe did buy,
An Horſe and Harneſs too;
They coſt the Sum of threeſcore Pounds,
Upon my Word 'tis true.
The Harneſs came to half of th' Horſe,
The Horſe twice of the Chaiſe;
And if you find the Price of them,
Take them and go your Ways.

Anſw.	*Chaiſe* - - - - - -	15 *l.*
	Horſe - - - - - -	30
	Harneſs - - - - -	15

104. A Gentleman courted a young Lady; and as their Birth Days happen'd together, they agreed to make that their Wedding-Day. On the Day of Marriage, it happen'd, that the Gentleman's Age was juſt double to that of the Lady's, that is as 2 to 1. After they had lived together 30 Years, the Gentleman obſerved that his Lady's Age drew nearer to his, and that his was only in ſuch Proportion to hers as 2 to $1\frac{3}{7}$. Thirty Years after this the ſame Gentleman found his and his Lady's Ages to be as near as 2 to $1\frac{3}{5}$; at which Time they both died. I demand their ſeveral Ages at the Day of their Marriage, and of their Death? Alſo the Reaſon why the Lady's Age, which was continually gaining upon her Huſband's, ſhould, notwithſtanding, be never able to overtake it?

A ſhort Collection of Pleaſant and diverting QUESTIONS.

1. A General having a Caſtle, ſituate on a Square, and garriſon'd by 48 Soldiers, ſo order'd them, as that any two Corners and the Side between them, ſhould conſiſt of 18 Men; but he thinking there were not Men enow, hired 8 more, but ſtill kept up the ſame Number of 18 Men as before; afterwards 16 Men were paid off, he not having Occaſion for them; but yet he kept up his Number of 18 Men; I demand how he muſt place the ſaid Men, to make 18 every Way, when he had 48, 56, and 40 Soldiers.

2. A poor Woman carrying ſome Eggs to Market, met with a rude Fellow, who broke them all; but preſently after, conſidering what he had done, went back and told the Woman he was willing to make Satisfaction, provided ſhe could tell how many there were; ſhe anſwered, ſhe could not tell, but the beſt Account that ſhe could give, was, that when ſhe told them in by two at a Time, there was one left, when by three, there was one left, and when by four, there was one left, but when ſhe told them in by five, there was none left: I demand how many Eggs the Woman had?

3. A Gentleman's Servant went to Market with an Order to buy 20 Fowls for 20*d.* he did ſo; and brought home Pigeons at 4*d.* a-piece, Larks at a Halfpenny a-piece, and Sparrows at a Farthing a-piece; I demand how many there were of each ſort?

4. Suppoſe the 9 Digits to be placed in a quadrangular Form: I demand in what Order they muſt ſtand, that any three Figures in a right Line may make juſt 15?

5. Let 12 be ſet down in four Figures, and let each Figure be the ſame.

6. A Countryman having a Fox, a Gooſe, and a Peck of Corn, in his Journey came to a River, where it ſo happened that he could carry but one over at a Time. Now, as no two were to be left together that might deſtroy each other: So he was at his Wits end how to diſpoſe of them: For, ſays he, Tho' the Corn can't eat the Gooſe, nor the Gooſe eat the Fox, yet the Fox can eat the Gooſe, and the Gooſe eat the Corn. The Queſtion is, how he muſt carry them over?

7. Three jealous Huſbands with their Wives, being ready to paſs by Night over a River, do find at the Water-ſide a Boat which can carry but two Perſons at once, and for want of a Waterman, they are neceſſitated to row themſelves over the River at ſeveral Times: The Queſtion is, how theſe 6 Perſons ſhall paſs by 2 and 2, ſo that none of the three Wives may be found in the Company of 1 or 2 Men unleſs her Huſband be preſent? *Wingate.*

8. Two merry Companions are to have equal Shares of 8 Gallons of Wine, which are in a Veſſel containing exactly 8 Gallons: Now to divide it equally between them, they have only two other empty Veſſels, of which one contains 5 Gallons, and the other 3; the Queſtion is, how they ſhall divide the ſaid Wine between them by the Help of theſe 3 Veſſels, ſo that they may have 4 Gallons a-piece? *Wingate.*

9. Says *Jack* to his Brother *Harry*, I can place four threes in ſuch manner that they ſhall make juſt 34; can you do ſo too?

F I N I S.

THE
Schoolmaſters Aſſiſtant.

PART V.

APPENDIX.

Of DUODECIMALS.

Q. *WHAT are* Duodecimals?

A. They are Fractions of a *Foot*, or of an *Inch*, or any Part of an *Inch*, having 12 for their Denominators.

NOTATION *of* DUODECIMALS.

Q. *HOW do you write* Duodecimals?

	F.	*I.*	*″*	*‴*	*⁗*	
A. Thus:	3	7	2	3	7,	*&c.*

Q. *How do you read them?*

A. Thus: 3 *Feet*, 7 *Inches*, 2 *Seconds*, 3 *Thirds*, 7 *Fourths*, &c.

Note 1, *Some call the Inches* Primes, *and make them thus* $7'$.

2. *Though this manner of dividing and ſubdividing a* Foot *is endleſs, yet it is ſo only in Imagination, and cannot be reduced to Practice, becauſe a* Second, *or the twelfth Part of an* Inch *is ſo ſmall, as to be incapable of any further Diviſion.*

ADDITION *of* DUODECIMALS.

Note, 12 *Fourths make* 1 *Third.*
12 *Thirds* —— 1 *Second.*
12 *Seconds* —— 1 *Inch.*
12 *Inches* —— 1 *Foot.*

EXAMPLES.

F.	*I.*	*″.*	*‴.*	*⁗.*
14	4	3	5	6
17	10	11	10	4
16	3	7	5	8
19	1	10	11	11
19	3	5	7	11
46	4	9	10	6

F.	*I.*	*″.*	*‴.*	*⁗.*
28	4	3	7	10
36	10	3	11	5
19	10	4	7	6
39	5	6	9	4
47	6	2	10	11
92	11	10	3	7

A Joiner having finiſhed ſeveral very curious Pieces of Workmanſhip, would know the Content of the Whole: Now the firſt Piece meaſured ſeventeen Feet, ten Inches, two Seconds, and one Third; the ſecond meaſured twenty Feet, four Inches, and ſeven thirds; the third forty-nine Feet, ſix Inches, and nine Seconds; the fourth fourſcore Feet, and ten Seconds; the fifth ſeventeen Feet and four Thirds; the ſixth threeſcore Feet, and ten Seconds; and the ſeventh thirty-ſeven Feet, and nine Thirds? What was the Content in Square Meaſure?

SUBTRACTION *of* DUODECIMALS.

EXAMPLES.

	F.	*I.*	*''.*	*'''.*	*''''.*		*F.*	*I.*	*''.*	*'''.*	*''''.*
From	74	3	4	7	6		100	5	7	3	1
Take	19	4	8	8	10		97	8	9	10	11
Diff.											

A Joiner having lined ſeveral Rooms, very curiouſly, with Cedar, finds the Amount to be, in Square Meaſure, 800*f.* 7*i.* 4''. but ſeveral Deductions being to be made for Windows, Arches, &*c.* thoſe Deductions amounted to 70*f.* 3*i.* 7''. 10'''. 5''''. how many Feet of Workmanſhip muſt he be paid for?

MULTIPLICATION *of* DUODECIMALS,

commonly called CROSS MULTIPLICATION.

Note, *Feet multiplied by Feet give Feet.*
Feet multiplied by Inches give Inches.
Feet multiplied by Seconds give Seconds.
Inches multiplied by Inches give Seconds.
Inches multiplied by Seconds give Thirds.
Seconds multiplied by Seconds give Fourths, &c.

EXAM-

EXAMPLES. 1. Of Feet and Inches.

	F.	I.	‴
Multiply	7	3	
By	4	7	
	29	0	
	4	2	9
Product	33	2	9

1. Here I multiply the 7*f.* 3*i.* firſt by 4 Feet (which gives Feet and Inches for the Product) ſaying 4 times 3 is 12, ſet down 0 and carry 1; then 4 times 7 is 28 and 1 is 29, which ſet down.

2. Next I multiply the ſame 7*f.* 3*i.* by 7 Inches (which give Inches and Seconds for the Product) ſaying 7 times 3 is 21, ſet down 9 Seconds and carry 1 Inch; then 7 times 7 is 49 and 1 is 50 Inches, or 4 Feet, 2 Inches, which ſet down; then add them together, and the whole is 33*f.* 2*i.* 9*ſec.*

	F.	I.	
Multiply	7	5	
By	3	9	
Product	27	9	9

F.	I.	
4	6	
5	8	
25	6	

F.	I.	
9	7	
9	7	
91	10	1

F.	I.	
8	3	
6	4	
52	3	

	F.	I.	
Multiply	4	7	
By	5	10	
Product	26	8	10

F.	I.
3	8
7	6
27	6

F.	I.	
9	7	
3	6	
32	10	6

	F.	I.	
Multiply	3	11	
By	9	5	
Product	36	10	7

F.	I.	
6	5	
7	6	
48	1	6

F.	I.	
7	10	
8	11	
69	10	2

The Truth of any one of theſe Operations, may be proved by reducing the Factors into Inches, and dividing their Product by 144 the Number of ſquare Inches in a Foot ſquare, the Quotient will be the Anſwer. *viz.*

First Sum.

1. *By whole Numbers.*

F. *I.* *I.*
7 3 = 87
4 7 = 55

435
435

144)4785(33
432

465
432

33
12

144)396(2
288

108
12

144)1296(9
1296

0

2. *By Vulgar Fractions.*

F.
Multiply $7\frac{3}{12}$
By $4\frac{7}{12}$

$$\frac{87}{12} \times \frac{51}{12} = \frac{5785}{144}$$

Then divide the Nnmerator by the Denominator, as before.

3. *By Decimals.*

Mult. 4.5833+
By 7.25

229165
91666
320831

33.228925
12

2.746100
12

8.9532

F. *I.* ″.
Facit 33 2 9

Note, *When the Number of* Feet *happens to be large in either or both of the* Factors, *instead of multiplying by* Inches *(if any be) you may take Parts with them.*

E X A M P L E S.

	F.	I.	‴.
Multiply	76	7	
By	48	9	
76 × 8 =	608		
76 × 4 =	304		
48 × 7 =	28		
$6\frac{1}{2}$	38	3	6
$3\frac{1}{2}$	19	1	9
Product	3733	5	3

F.	I.	
46	7	
39	8	
1847	9	8
F.	I.	
76	7	
19	10	
1518	10	10

F.	I.	
71	7	
84	6	
6048	9	6
F.	I.	
36	1	
18	8	
673	6	8

	F.	I.	
Multiply	84	3	
By	95	2	
Product	8017	9	6

F.	I.	
48	7	
26	8	
1895	6	8

F.	I.	
79	8	
38	11	
3100	4	4

	F.	I.	
Multiply	127	6	
By	184	8	
Product	23545	0	

F.	I.	
767	5	
198	3	
152140	4	6

F.	I.	
7691	10	
1976	11	
15206212	9	2

2. Of Feet, Inches, and Seconds.

	F.	I.	″.	‴	⁗
Multiply	7	3	2		
By	1	7	3		
	7	3	2		
	4	2	10	2	
		1	9	9	6
Product	11	7	9	11	6

F.	I.	″.	
8	6	9	
7	3	8	
62	6	7	9

F.	I.	″.
3	10	6
7	4	8
28	7	7

F.	I.	″.		
7	1	9		
7	8	9		
55	2	9	3	9

F.	I.	″.		
3	8	4		
3	9	2		
13	10	10	4	8

F.	I.	″.		
9	8	7		
12	3	10		
119	8	2	10	10

F.	I.	″.		
9	8	7		
6	5	4		
62	7	3	9	4

F.	I.	″.		
3	2	1		
2	3	4		
7	2	8	11	4

F.	I.	″.		
5	6	7		
8	9	10		
48	11	2	8	10

Note, *If the Number of* Feet *is large, inſtead of multiplying by the* Inches *and* Seconds, *you may take Parts with them.*

EXAMPLES.

I.	*F.*	*I.*	*″.*		
$6\frac{1}{2}$)	76	3	9		
	84	7	11		
76 × 4 =	304	0	0		
76 × 8 =	608	0	0		
3 × 84 =	21	0	0		
9 × 84 =	5	3	0	‴	
I. $1\frac{1}{6}$)	38	1	10	6	
″$6\frac{1}{2}$)	6	4	3	9	⁗
$3\frac{1}{2}$)	3	2	1	10	6
$2\frac{1}{3}$)	1	7	0	11	3
	1	0	8	7	6
	6460	7	1	8	3

F.	*I.*	*″.*		
71	3	6		
92	1	7		
6568	2	10	6	6

F.	*I.*	*″.*	
56	1	8	
97	3	9	
5463	0	2	3

F.	*I.*	*″.*		
371	2	6		
181	1	9		
67242	10	1	4	6

F.	*I.*	*″.*	
87	3	4	
18	1	7	
1582	6	2	3

F.	*I.*	*″.*		
64	3	7		
27	2	6		
1571	5	5	11	6

F.	*I.*	*″.*		
49	3	1		
48	1	2		
2369	1	5	7	2

F.	*I.*	*″.*	
71	2	6	
81	1	8	
5777	9	2	2

F.	*I.*	*″.*	
756	1	8	
184	2	6	
139287	1	0	2

F.	*I.*	*″.*		
487	11	10		
186	10	11		
91299	4	2	2	2

A Decimal

A Decimal Table of Inches and Seconds.

I.	S.	Decimals.	I.	S.	Decimals.	I.	S.	Decimals.	I.	S.	Decimals.
	1	.006944	1	1	.090277	2	1	.173611	3	1	.256944
	2	.013888		2	.097221		2	.180554		2	.263888
	3	.020833		3	.104166		3	.187499		3	.270833
	4	.027777		4	.111111		4	.194443		4	.277777
	5	.034722		5	.118055		5	.201388		5	.284722
	6	.041666		6	.124999		6	.208332		6	.291666
	7	.048611		7	.131944		7	.215277		7	.298611
	8	.055555		8	.138888		8	.222222		8	.305555
	9	.0625		9	.145833		9	.229166		9	.3125
	10	.069444		10	.152777		10	.236111		10	.319444
	11	.076388		11	.159721		11	.243054		11	.326388
1	0	.083333	2	0	.166666	3	0	.25	4	0	.333333
I.	S.	Decimals.	I.	S.	Decimals.	I.	S.	Decimals.	I.	S.	Decimals.
4	1	.340277	5	1	.423611	6	1	.506944	7	1	.590277
	2	.347221		2	.430555		2	.513888		2	.597222
	3	.354166		3	.437499		3	.520833		3	.604166
	4	.361111		4	.444444		4	.527777		4	.611111
	5	.368055		5	.451388		5	.534722		5	.618055
	6	.374999		6	.458333		6	.541666		6	.624999
	7	.381944		7	.465277		7	.548611		7	.631944
	8	.388888		8	.472222		8	.555555		8	.638888
	9	.395833		9	.479166		9	.5625		9	.645833
	10	.402777		10	.486111		10	.569444		10	.652777
	11	.409721		11	.493054		11	.576388		11	.659721
5	0	.416666	6	0	.5	7	0	.583333	8	0	.666666
I.	S.	Decimals.	I.	S.	Decimals.	I.	S.	Decimals.	I.	S.	Decimals.
8	1	.673611	9	1	.756944	10	1	.840277	11	1	.923611
	2	.680555		2	.763888		2	.847222		2	.920555
	3	.687499		3	.770833		3	.854166		3	.937499
	4	.694444		4	.777777		4	.861111		4	.944444
	5	.701388		5	.784722		5	.868055		5	.951388
	6	.708332		6	.791666		6	.874999		6	.958333
	7	.715277		7	.798611		7	.881944		7	.965277
	8	.722222		8	.805555		8	.888888		8	.972222
	9	.729166		9	.8125		9	.895833		9	.979166
	10	.736111		10	.819444		10	.902777		10	.986111
	11	.743054		11	.826388		11	.909721		11	.993054
9	0	.75	10	0	.833333	11	0	.916666	12	0	1.

The Conſtruction of the foregoing TABLE.

Let it be required to find what Part of a Foot one Second is in Decimals.

1. One Foot reduced into Seconds, makes 144 Seconds.
2. The Vulgar Fraction will then be $\frac{1}{144}$ of a Foot.
3. Divide the upper Term by the lower, and the Quotient thence ariſing will be the Anſwer,

```
144(1.000000(,006944 +
      864
      ----
      1360
      1296
      -----
        640
        576
        ----
         640
         576
         ---
          64
          --
```

After the ſame Manner the whole Table is made, except in the Caſe of Inches only; as in the Caſe of one Inch, where the Vulgar Fraction will be $\frac{1}{12}$ of a Foot. Divide the upper Term by the lower, as before, and you have the Quotient for the Anſwer.

```
12)1.000000(.083333+
          4
```

Note 1, *If the given Part of a* Foot *conſiſt only of* Inches, *the Diviſor need be no more than* 12, *becauſe* 12 *Inches make* 1 Foot.

2. *If the given Part of a* Foot *conſiſt of* Seconds *only, or* Inches *and* Seconds *together, then* 144 *muſt be the Diviſor, becauſe* 144 *Seconds make* 1 Foot.

The

The Uſe of the foregoing TABLE.

Let the firſt Example in Multiplication be given, *viz.*

	F.	I.
Multiply	7	3
By	4	7

Look, in the Table, for 3 Inches, againſt which ſtands .25 — Again, look for 7 Inches, againſt which ſtands .583333 — Hence it follows, that 7*f.* 3*i.* = 7.25*f.* and 4*f.* 7*i.* = 4.583333*f.*

Note, *It is common in any large Number of* Decimals, *to ſave Trouble in the Operation, by making one of them one Part larger, which cuts off all the following Figures; thus* 4.583333*f. may be made* 4.584*f.*

```
             F.
Multiply   7.25
By         4.584
          ------
           2900
          5800
         3625
        2900
        --------
        33.23400
              12
        --------
           2.808
              12
          ------
           9.696
```

	F.	I.	''.
Anſw.	33	2	9

Again; let the firſt Example in Feet, Inches and Seconds be given, *viz.*

	F.	I.	''.
Multiply	7	3	2
By	1	7	3

Look in the Table for 3*i.* 2*ſ.* and againſt them you will find .263888; alſo look in the ſame Table for 7*i.* 3*ſ.* and againſt them you will find .604166: Then, by ſhortening the Decimals,

Multiply 7.264
By 1.6041

7264
29056
43584
7264

11.6521824
12

7.826l6
12

9.91392
12

10.96704
12

11.60448

F. I. ''. '''. ''''.
Anſw. 11 7 9 10 11 *the Difference being inconſiderable.*

DIVISION *of* DUODECIMALS.

	F.	I.	''.	F.	I.	''.
2)	146	7	10(	73	3	11
3)	761	4	11(			
4)	963	2	10(			
5)	186	1	10(			
6)	76	3	11(			
7)	186	1	10(			
8)	712	8	4(			
9)	812	3	5(			
10)	861	11	10(			

	F.	I.	''.	'''	''''
11)	123	4	5(		
12)	76	8	7(		
7)	86	3	7	4	8(
8)	98	4	6	9	1(
9)	86	2	1	1	7(
10)	47	3	4	6	1(
11)	96	2	7	11	4(
12)	83	1	6	9	10(
12)	78	10	11	10	9(

Note 1, *It very ſeldom happens that the* Diviſor *conſiſts of more than one Denomination: Yet becauſe ſuch* Diviſors *may ſometimes offer themſelves, I will give a few for the Reader's Satisfaction, which muſt be wrought after the manner of* Long Diviſion, *and may ſerve alſo as Proofs to ſome of the foregoing Examples in* Multiplication.

2. *This ſort of* Diviſion *often admits of two Figures at once in the* Quotient.

EXAM-

EXAMPLES.

F. I. F. I. ″. F. I.
4 5)33 1 6(7 6
4 5×7 = 30 11
2 2 6
4 5×6 = 2 2 6
0

Note, *If the Feet in the* Quotient *conſiſt of more than one Figure, you muſt conſider*

1. *How many Figures are required in the* Feet *by common Diviſion.*
2. *If the* Feet *required conſiſt only of two Figures, you muſt multiply the* Diviſor *by the firſt Figure (which ſtands in tens Place) with a Cypher annexed. But*
3. *If the* Feet *required conſiſt of three Figures, you muſt multiply the* Diviſor *by the firſt Figure (which ſtands in Hundreds Place) with two Cyphers annexed; and the next Figure in the* Quotient *(which ſtands in tens Place) with one Cypher annexed.*
4. *Whatever the Product is in* Feet *and* Inches, *let it be placed under the* Dividend, *in ſuch manner, that* Feet *and* Inches *may ſtand under* Feet *and* Inches, *and* Units *under* Units.
5. *With regard to the Number of* Feet *in the* Dividend, *you muſt proceed according to the common Method of* Long Diviſion, *'till you have obtain'd the Number of* Feet *required in the* Quotient.

F. I. F. I. ″. F. I.
184 8)235.45 0 0(127 6
184 8×100 = 184.66 8
507.8 4
184 8×10 = 369.3 4
1385 0
184 8×7 = 1292 8
92 4 0
184 8×6 *Inches* = 92 4 0
0

F. I. F. I. ″. F. I.
48 9)3733 5 3(76 7
48 9×70 = 3412 6
320 11
48 9×6 = 292 6
28 5 3
48 9×7 *In.* = 28 5 3
0

F. *I.* *F.* *I.* *″.* *F.* *I.*
79 8)3100 4 4(38 11
79 8×30 = 2390
———
710 4
79 8×8 = 637 4
———
73 0 4
79 8×11 *In.* = 73 0 4
———
0
—

F.	*I.*	*F.*	*I.*	*″.*
6	7)	31	3	3(
8	10)	87	7	2(
8	9)	83	10	3(
12	9)	130	8	3(
11	5)	140	9	8(
9	3)	116	4	9(

F.	*I.*	*F.*	*I.*	*″.*
39	8)	1847	9	8(
84	6)	6048	9	6(
19	10)	1518	10	10(
95	2)	8017	9	6(
26	8)	1895	6	8(
18	8)	673	6	8(

F. *I.* *″.* *F.* *I.* *″.* *‴.* *⁗.* *F.* *I.* *″.*
1 7 3)11 7 9 11 6(7 3 2
11 2 9
———
5 0 11
4 9 9
———
3 2 6
3 2 6
———
0
—

F.	*I.*	*″.*	*F.*	*I.*	*″.*	*‴.*	*⁗.*	*F.*	*I.*	*S.*	*F.*	*I.*	*″.*	*‴.*	*⁗.*
7	3	8)	62	6	7	9(		12	3	10)	129	8	2	10	10(
3	10	6)	28	7	7	0(		9	8	7)	62	7	3	9	4(
7	1	9)	55	2	9	3	9(	3	2	1(	7	2	8	11	4(
3	9	2)	13	10	10	4	8(	8	9	10)	48	11	2	8	10(

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